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# AUTOMOTIVE INDUSTRIES

## The AUTOMOBILE

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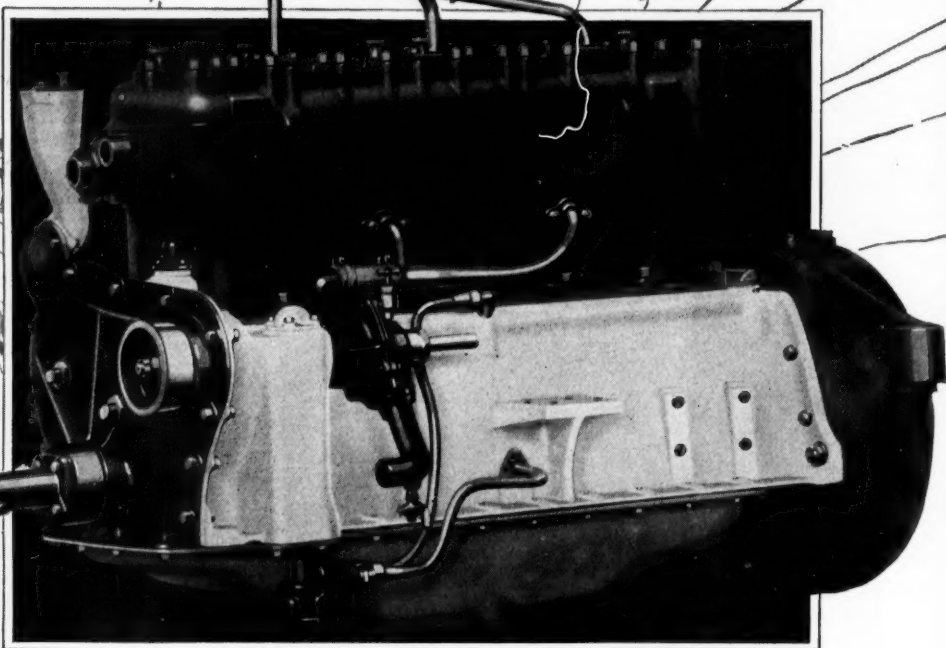
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**LARGEST MOTOR SPECIALISTS IN THE WORLD**



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# AUTOMOTIVE INDUSTRIES

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NEW YORK—THURSDAY, JULY 17, 1924

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## Registrations Totaled 15,523,898 on July 1, 1924

2,475,770 more cars in service than on the same date in 1923,  
an increase of 19 per cent. Trucks climb from 11 to  
12.3 per cent of total. Fees are \$195,821,622.

By D. G. o'Connor

**P**ASSENGER cars and trucks registered in the United States on July 1, 1924, totaled 15,523,898. This was an increase of approximately two and one-half millions, 2,475,770 to be exact, or 19 per cent over July 1, 1923. Trucks which had represented 10 to 11 per cent crept up to 12.3 per cent of the total. There is one motor vehicle for every 7.2 persons in the United States.

Fees paid in the first six months of 1924 amounted to \$195,821,622, an increase of approximately \$45,000,000 over the first six months of 1923; and, in round numbers, \$5,000,000 more than was paid during the twelve months ending December 31, 1923.

The number of motorcycles registered has declined consistently since 1919. Totaling 240,090 on Dec. 31 of that year, they now number only 126,386, a decrease of almost fifty per cent in less than five years.

In the face of these constantly decreasing numbers, Massachusetts showed a gain of 3,023 motorcycles, and Connecticut followed with an increase of 1,158. To offset this, California showed a loss of 1,692, Pennsylvania a loss of 1524, and Wisconsin a loss of 1,315.

### Six and Twelve Month Figures

While passenger car and truck figures from July 1, 1923, to July 1, 1924, show a gain of 19 per cent, the period from Dec. 31, 1923, to July 1, 1924, does not record nearly so good a showing. The increase was only 301,240 for the six months.

This small gain is doubtless to be explained in several ways. The tremendous volume of purchases which were made in the fall and early winter of 1923, the

long, cold spring of this year, and the feeling of uncertainty which has predominated in business over a period of months all have had their effect on car sales.

Since the last six months of the year are almost certain to show a gain in each of the states, a loss in the first six months over the year-end figures does not mean as much as the actual figures might indicate. New York, for instance, showed a loss during the first six months of 1923 over the year-end total of 1922, only to show a gain of more than two hundred thousand at the end of the year. This condition was true of several other states as well.

### Comparing Registrations

As a matter of fact, these mid-year registration figures can be compared directly only with those collected for July 1 of previous years. Failure of registrations in a given State to reach the total of the end of the previous year is of little significance in most cases, since the last six months are almost certain to show a gain. The relation between the mid-year figures and the year-end figures is affected by variations in law enforcement and similar factors which make comparisons difficult.

Where a State at mid-year has already exceeded the total of the previous year, it is evident that a substantial gain is to be expected by the end of the year.

At the end of the first six months of 1924 there remained only eleven States and the District of Columbia, which had not passed the 100,000 mark, namely: Arizona, Delaware, Idaho, Montana, Nevada, New Hampshire, New Mexico, Rhode Island, Utah, Vermont, and Wyoming.

## Motor Vehicle Registration Statistics

### July 1, 1924

States	Total Registrations of Cars and Trucks	Passenger Cars	Trucks	Motorcycles	Total Fees
Alabama	133,309	118,378	14,931	330	\$1,814,097.92
Arizona	49,161	42,536	6,625	270	305,527.50
Arkansas	116,865	103,602	13,263	250	2,350,000.00
California	1,180,800	1,015,024	165,776	10,553	5,964,577.46
Colorado	187,675	174,677	12,998	1,590	1,159,697.77
Connecticut	185,763	156,621	29,142	3,299	4,545,130.30
Delaware	35,000	31,000	4,000	400	700,000.00
District of Columbia	75,401	66,912	8,489	1,431	319,299.00
Florida	170,000	136,000	34,000	1,100	2,130,000.00
Georgia	175,100	152,500	22,600	388	2,315,612.14
Idaho	63,268	56,481	6,787	559	1,220,060.45
Illinois	986,480	862,452	124,028	5,387	10,696,508.51
Indiana	581,575	508,831	72,744	3,794	3,783,826.00
Iowa	569,358	531,662	37,696	2,336	8,523,565.96
Kansas	361,031	327,207	33,824	1,201	182,181.00
Kentucky	214,000	192,000	22,000	800	3,000,000.00
Louisiana	143,000	121,000	22,000	350	2,300,000.00
Maine	105,061	89,263	15,798	921	1,663,763.43
Maryland	175,718	165,636	10,082	2,827	1,871,305.75
Massachusetts	561,836	481,598	80,238	8,313	6,667,795.00
Michigan	765,044	692,090	72,954	3,046	11,100,000.00
Minnesota	462,777	429,627	33,150	2,754	8,012,922.65
Mississippi	114,070	102,663	11,407	66	519,298.00
Missouri	477,056	430,621	46,435	1,706	3,928,326.02
Montana	69,100	61,100	8,000	223	700,000.00
Nebraska	276,592	250,592	26,000	800	3,250,564.62
Nevada	15,995	12,500	3,495	91	167,010.55
New Hampshire	64,370	56,770	7,600	1,431	1,474,393.16
New Jersey	435,894	338,133	97,761	6,398	8,078,837.90
New Mexico	35,273	30,100	5,173	184	372,760.79
New York	1,169,145	963,564	205,581	16,324	19,356,688.91
North Carolina	285,000	260,000	25,000	1,400	3,975,565.37
North Dakota	102,824	100,000	2,824	406	706,628.85
Ohio	1,160,000	999,300	160,700	13,590	10,500,000.00
Oklahoma	295,000	275,000	20,000	800	2,973,026.73
Oregon	161,739	149,647	12,092	2,235	4,336,682.54
Pennsylvania	1,088,387	931,465	156,922	14,598	19,562,394.31
Rhode Island	78,413	64,145	14,268	1,122	1,336,101.50
South Carolina	139,245	125,964	13,281	380	1,069,751.29
South Dakota	127,400	117,812	9,588	260	1,874,787.50
Tennessee	165,170	147,000	18,170	640	2,375,000.00
Texas	661,949	614,043	47,906	2,135	9,481,216.72
Utah	67,133	58,784	8,349	600	442,810.00
Vermont	52,614	49,053	3,561	639	1,186,230.61
Virginia	229,784	197,052	32,732	1,350	3,335,000.00
Washington	290,438	227,015	63,423	2,457	4,497,807.47
West Virginia	151,222	133,572	17,650	1,094	2,552,544.35
Wisconsin	474,063	429,784	44,279	3,348	6,739,389.68
Wyoming	37,800	33,700	4,100	210	402,924.01
Totals	15,523,898	13,614,476	1,909,422	125,746	\$195,821,622.00

The total registration figures for Dec. 31, 1922, show that there were at that time seventeen States and the District of Columbia, which had fewer than 100,000 passenger cars and trucks. On July 1, 1923, there remained sixteen States and the District of Columbia, which had a total registration of less than 100,000.

#### States with More Than 100,000 Totals

In the period from July 1, 1923 to July 1, 1924, the number of States which had less than 100,000 total registrations, had decreased to twelve and the District of Columbia. In other words, five of the six-

teen States which had registrations ranging from Nevada with 12,766 to North Dakota with 99,000 on July 1 of last year have gone over the top with more than 100,000 motor vehicles in operation.

#### In Terms of Percentages

To put it in terms of percentages and disregarding the District of Columbia, approximately 35.5 per cent of the States showed total registrations under the hundred thousand mark at the end of 1922; this had decreased to 33 per cent on July 1, 1923; and on July 1 of this year, over a period of twelve months, had still further decreased from 33 to 23 per cent.



**Registration of Cars and Trucks, July 1, 1924**

California .....	1,180,800
New York .....	1,169,145
Ohio .....	1,160,000
Pennsylvania .....	1,088,387
Illinois .....	986,480
Michigan .....	765,044
Texas .....	661,949
Indiana .....	581,575
Iowa .....	569,358
Massachusetts .....	561,836
Missouri .....	477,056
Wisconsin .....	474,063
Minnesota .....	462,777
New Jersey .....	435,894
Kansas .....	361,031
Oklahoma .....	295,000
Washington .....	290,438
North Carolina .....	285,000
Nebraska .....	276,592
Virginia .....	229,784
Kentucky .....	214,000
Colorado .....	187,675
Connecticut .....	185,763
Maryland .....	175,718
Georgia .....	175,100
Florida .....	170,000
Tennessee .....	165,170
Oregon .....	161,739
West Virginia .....	151,222
Louisiana .....	143,000
South Carolina .....	139,245
Alabama .....	133,309
South Dakota .....	127,400
Arkansas .....	116,865
Mississippi .....	114,070
Maine .....	105,061
North Dakota .....	102,824
Rhode Island .....	78,413
District of Columbia .....	75,401
Montana .....	69,100
Utah .....	67,133
New Hampshire .....	64,370
Idaho .....	63,268
Vermont .....	52,614
Arizona .....	49,161
Wyoming .....	37,800
New Mexico .....	35,273
Delaware .....	35,000
Nevada .....	15,995
<b>Total .....</b>	<b>15,523,898</b>

**Percentage Gains and Losses in Registration, July 1, 1923, to July 1, 1924**

	Per Cent Gained
New Mexico .....	30.2
North Carolina .....	26.5
South Carolina .....	25.9
Alabama .....	25.8
Mississippi .....	25.0
Delaware .....	24.8
Louisiana .....	23.0
Washington .....	22.7
California .....	21.1
Nevada .....	20.3
Florida .....	20.1
Utah .....	19.5
Virginia .....	19.5
Connecticut .....	18.8
Oklahoma .....	18.6
New Hampshire .....	18.5
Michigan .....	18.3
Kentucky .....	18.2
Massachusetts .....	18.0
Oregon .....	17.2
New Jersey .....	17.2
Arizona .....	17.0
Indiana .....	17.0
Rhode Island .....	16.8
Arkansas .....	16.3
West Virginia .....	16.3
Ohio .....	15.9
Idaho .....	15.6
Georgia .....	15.4
Illinois .....	15.4
Pennsylvania .....	15.3
Vermont .....	15.2
New York .....	15.1
Missouri .....	13.6
Texas .....	13.6
Minnesota .....	12.4
Tennessee .....	12.2
Nebraska .....	11.8
Wisconsin .....	11.7
Colorado .....	10.7
Maryland .....	10.5
Maine .....	10.4
Iowa .....	9.1
Kansas .....	8.1
Wyoming .....	8.0
Montana .....	7.5
South Dakota .....	5.8
North Dakota .....	3.8
<b>Losses</b>	
District of Columbia .....	9.1
<b>Average gain .....</b>	<b>19.0</b>

**Numerical Gains and Losses in Car and Truck Registration, July 1, 1923, to July 1, 1924**

	Gains
California .....	249,190
Ohio .....	185,000
New York .....	177,262
Pennsylvania .....	166,325
Illinois .....	152,560
Michigan .....	140,454
Massachusetts .....	101,038
Indiana .....	98,897
Texas .....	89,968
North Carolina .....	75,600
New Jersey .....	75,317
Washington .....	65,871
Missouri .....	64,719
Minnesota .....	57,552
Wisconsin .....	55,517
Oklahoma .....	55,000
Iowa .....	52,130
Virginia .....	44,708
Kentucky .....	39,000
South Carolina .....	36,196
Connecticut .....	34,850
Alabama .....	34,317
Florida .....	34,107
Louisiana .....	33,000
Nebraska .....	32,592
Kansas .....	29,095
Mississippi .....	28,425
Oregon .....	27,744
Georgia .....	27,100
West Virginia .....	24,691
Tennessee .....	20,170
Colorado .....	20,113
Arkansas .....	18,936
Maryland .....	18,372
Rhode Island .....	13,206
Utah .....	13,132
New Hampshire .....	11,936
Maine .....	11,000
New Mexico .....	10,659
Idaho .....	9,901
Arizona .....	8,383
Delaware .....	8,700
Vermont .....	8,001
South Dakota .....	7,369
Montana .....	5,150
North Dakota .....	3,824
Nevada .....	3,229
Wyoming .....	3,047
<b>Losses</b>	
District of Columbia .....	7,583
<b>Gains .....</b>	<b>2,483,353</b>
<b>D. C. Loss .....</b>	<b>7,583</b>
<b>Total Gains .....</b>	<b>2,475,770</b>

California, New York, Ohio, and Pennsylvania stand well above the million mark in the order given. Illinois, which had 986,490 registrations on July 1, is first on a list of six States whose registration is above 500,000 but under 1,000,000, and there are 27 States whose registrations range between 100,000 and the half-million mark.

In other words there are now 37 States which individually have from 100,000 to more than one million motor vehicles, five more than there were at this time last year.

The largest gain recorded over December 31, 1923, in numbers was made by the State of Ohio with an increase of 91,300. Thirteen States showed an increase of more than 10,000.

The largest percentage gain was made by the State

of Massachusetts, 18 per cent, 85,686 in number and second only to Ohio. Following it were Delaware with a gain of 16.8 per cent, North Carolina with a gain of 15.1 per cent, and Washington and New Mexico with gains of 11.2 and 11.1 per cent respectively.

**Greatest Numerical Gain**

For the period of the twelve months from July 1, 1923, to July 1, 1924, California showed the greatest numerical gain, 249,190. It was followed by New York, Ohio, Pennsylvania, Illinois and Michigan with more than 100,000 additional registrations each.

High percentage gains for the twelve months ending July 1, 1924, were made by North Carolina with 26.5 per cent, South Carolina with 25.9 per cent, Alabama with 25.8 per cent, Mississippi with 25 per

cent, and Louisiana with 23 per cent.

Again the Southern States contributed very large percentage gains in registration, which would lead to the belief that the cotton crop depletion of the world stocks of cotton and the mills which have been developed there made these States prosperous.

Large percentage increases were, aside from the South, scattering. New Mexico topped the list with an increase of 30.2 per cent. Delaware increased her registrations 24.8 per cent. Washington showed an increase of 22.7 per cent, California 21.1 per cent, Virginia 19.5 per cent, Connecticut 18.8 per cent, Oklahoma 18.6 per cent, and Michigan 18.3 per cent.

New York showed the greatest loss in numbers, 45,497, for the period from December 31, 1923, to July 1, 1924, with Maryland, Texas and the District

of Columbia following with a loss of more than 25,000 each.

The District of Columbia showed a loss of 27 per cent, Maryland a loss of 19.5 per cent, and West Virginia, North Dakota and Wyoming followed, but were all three under 7 per cent.

### Trucks in Operation

Trucks in excess of 100,000 are in operation in New York, California, Ohio, Pennsylvania and Illinois.

Though New York operates more trucks than California, the latter State has gone ahead of the Empire State in total registrations by 11,655 and in the number of passenger cars by 51,460.

Every State shows an increase for the twelve

### Gains and Losses in Registration Dec. 31st, 1923—July 1st, 1924

	Gains
Ohio .....	91,300
Massachusetts .....	85,686
California .....	80,517
North Carolina .....	37,388
Michigan .....	34,386
Washington .....	29,214
Pennsylvania .....	23,763
Illinois .....	17,149
Wisconsin .....	16,792
Kentucky .....	15,653
Minnesota .....	14,590
Virginia .....	10,692
South Carolina .....	10,589
Florida .....	10,000
Mississippi .....	9,670
Connecticut .....	7,832
Alabama .....	6,667
Delaware .....	5,023
New Jersey .....	4,936
Arkansas .....	4,919
New Hampshire .....	4,799
Louisiana .....	4,500
New Mexico .....	3,536
Georgia .....	1,306
Utah .....	1,108
Idaho .....	889
Missouri .....	683
Arizona .....	420
Nevada .....	295
Total .....	534,302

	Losses
New York .....	45,497
Maryland .....	34,220
District of Columbia .....	27,770
Texas .....	26,950
Kansas .....	14,563
Oklahoma .....	12,000
West Virginia .....	10,969
Nebraska .....	9,461
Tennessee .....	8,195
Rhode Island .....	7,067
Iowa .....	7,040
North Dakota .....	6,420
Montana .....	4,728
Oregon .....	4,673
South Dakota .....	4,320
Maine .....	3,548
Wyoming .....	2,031
Indiana .....	1,767
Colorado .....	1,681
Vermont .....	162
Total .....	233,062

	Per Cent Gains
Delaware .....	16.80
North Carolina .....	15.10
Washington .....	11.20
New Mexico .....	11.10
Mississippi .....	9.30
Ohio .....	8.60
South Carolina .....	8.20
New Hampshire .....	8.00
Kentucky .....	7.90
California .....	7.30
Florida .....	6.30
Alabama .....	5.20
Virginia .....	4.80
Michigan .....	4.70
Arkansas .....	4.40
Connecticut .....	4.40
Wisconsin .....	3.60
Louisiana .....	3.20
Minnesota .....	3.20
Pennsylvania .....	2.20
Massachusetts .....	1.80
Nevada .....	1.80
Illinois .....	1.70
Utah .....	1.60
Idaho .....	1.40
New Jersey .....	1.10
Arizona .....	.85
Georgia .....	.70
Missouri .....	.14

	Per Cent Losses
District of Columbia .....	27.00
Maryland .....	19.50
Rhode Island .....	8.30
West Virginia .....	6.70
Montana .....	6.40
North Dakota .....	5.90
Wyoming .....	5.10
Tennessee .....	4.70
New York .....	3.90
Oklahoma .....	3.90
Texas .....	3.90
Kansas .....	3.80
Nebraska .....	3.30
South Dakota .....	3.30
Maine .....	3.20
Oregon .....	2.80
Iowa .....	1.20
Colorado .....	.90
Indiana .....	.30
Vermont .....	.30

### Number of Persons Per Vehicle July, 1924

California .....	3.2
Iowa .....	4.3
Nebraska .....	4.8
Nevada .....	4.8
Kansas .....	5
Washington .....	5
Oregon .....	5.1
Indiana .....	5.2
Michigan .....	5.2
South Dakota .....	5.2
Colorado .....	5.3
District of Columbia .....	5.3
Ohio .....	5.3
Minnesota .....	5.4
Wyoming .....	5.7
Wisconsin .....	5.8
Florida .....	6.2
North Dakota .....	6.5
Delaware .....	6.6
Vermont .....	6.7
Illinois .....	6.9
New Hampshire .....	7
Utah .....	7.1
Massachusetts .....	7.2
Missouri .....	7.2
Maine .....	7.4
Oklahoma .....	7.4
Idaho .....	7.5
Texas .....	7.5
New Jersey .....	7.8
Arizona .....	7.9
Connecticut .....	8
Rhode Island .....	8
Pennsylvania .....	8.4
Maryland .....	8.6
Montana .....	9
New York .....	9.3
North Carolina .....	9.5
West Virginia .....	10.3
Virginia .....	10.5
New Mexico .....	10.6
Kentucky .....	11.5
South Carolina .....	12.6
Louisiana .....	12.9
Tennessee .....	14.5
Arkansas .....	15.7
Mississippi .....	15.7
Georgia .....	17.2
Alabama .....	18.3
United States .....	7.2



## Motorcycles

Gains		Losses	
July 1, 1923-1924		July 1, 1923-1924	
Massachusetts .....	3,023	California .....	1,692
Connecticut .....	1,158	Pennsylvania .....	1,524
Oklahoma .....	300	Wisconsin .....	1,315
Florida .....	269	Indiana .....	934
New Mexico .....	132	Maryland .....	686
Kentucky .....	112	New Jersey .....	599
West Virginia .....	85	Texas .....	588
Delaware .....	30	New York .....	543
Idaho .....	17	Ohio .....	490
Alabama .....	8	Illinois .....	453
Nevada .....	5	Dist. of Columbia .....	444
Total .....	5,139	Georgia .....	417
		Colorado .....	409
		Michigan .....	360
		Iowa .....	355
		Washington .....	326
		Maine .....	312
		Missouri .....	277
		Kansas .....	257
		Oregon .....	236
		Nebraska .....	195
		New Hampshire .....	159
		Rhode Island .....	126
		South Dakota .....	116
		North Dakota .....	94
		Montana .....	73
		South Carolina .....	65
		North Carolina .....	50
		Virginia .....	50
		Louisiana .....	50
		Wyoming .....	48
		Mississippi .....	43
		Utah .....	35
		Arizona .....	39
		Minnesota .....	26
		Vermont .....	22
		Arkansas .....	13
		Total .....	13,421

months ending July 1, 1924. The District of Columbia alone shows a loss, which may be accounted for by the confusion in registration figures which has existed there.

The need for uniformity in registration methods still exists, although a good many States have made tremendous strides in the way of improvement. The intelligence and accuracy with which registration data are compiled is steadily increasing year by year. Individual advance, however, has not facilitated in any way the difficulty of properly and accurately combining the registration data gathered from the forty-eight states. There is still no uniformity of nomenclature or definition or terms so far as the various states are concerned. Each is literally a law unto itself, and registration information, accurate as to detail, can be obtained only at the cost of persistent effort and careful study of constantly changing methods.

Some of the States list buses separately, while others list them as trucks. In these figures we have considered buses as trucks. The proportion of trucks to passenger cars too is important and varies considerably in the various states.

#### Trends and Markets Possibilities

In making estimates of sales trends and marketing possibilities this must be borne in mind and each state considered individually. While the general average of trucks to passenger cars has increased to 12.3 per cent, it is unsafe to apply this general average in a particular case and expect to get highly accurate results. The trend of passenger car and truck sales in each state, and in the various sections of the individual states, has to be examined as to density of population, the nature of products manufactured or grown, and distances and roads as related to surrounding territory and points of shipping, urban centers and the like, if proper conclusions are to be reached.

The fees paid by motorists continue to increase. In 1922 the fees collected averaged \$12.25 per vehicle; in 1923 the average was about \$12.50 and for the first six months of this year the average was about \$12.60.

Along with the increase in fees per vehicle, which has been going on for some time, automobile owners

are being asked to pay more individually for the operation of their cars every year. The tax on gasoline, which is in operation in many states, increases this to a very considerable extent.

The constantly growing total of motor vehicle license fees indicates that the users of automobiles and trucks are carrying all of their share of the country's tax burden, if not more.

#### What Registration Data Reveals

A STUDY of registration and production data reveals that in 1895 there were about three hundred motor vehicles registered and that the growth from that time was fairly uniform until the figure reached two and a half millions approximately in 1915. The increase of thirteen millions in the nine years since that time has been by leaps and bounds.

There was an increase of just over a million in 1916, of almost a million and a half in 1917, a million in 1918, a million and a half in 1919, one and three-quarter million in 1920, a million and a quarter in 1921, almost two millions in 1922 and almost three millions in 1923.

Approximately 5,600,000 of the 20,000,000 motor vehicles which had been produced up to the end of 1923 had been scrapped. Average life of a car has been increasing gradually. Estimates indicate that it is now about six and one-half years and that the development of balloon tires and other shock-absorbing devices will increase the period.

It has been possible to establish relations between registration and population, for the curve showing the number of persons per vehicle seems to follow a fairly definite line.

Estimates have been made covering a future period of from twenty-five to thirty-five years, up to 1950 or 1960, and today the future population in any district or districts is considered to be the most important factor in determining the trend in the future number of automobiles.

FROM the National Research Council of the National Academy of Science, Washington, D. C., we have received a copy of the Proceedings of the Third Annual Meeting of the Advisory Board on Highway Research. It contains the papers presented at that meeting, with the discussions thereon.

# New Transmission Allows for Changing Gears Without Interrupting Torque

*Automatic Clutch and Transmission Co. have combined a direct with a hydraulic drive in such a way that the latter works automatically at low speeds, in starting and under heavy load.*

**W**ITH a view to facilitating the operation of a car or truck a new clutch-transmission combination working on the hydraulic principle has been developed by the Automatic Clutch & Transmission Co. of Philadelphia. Under all ordinary conditions of operation the drive is direct, and it is only in starting and when the vehicle is proceeding at such a low speed that the engine would be laboring if connected in high gear, that the hydraulic transmission is made use of. The change-over from drive through the hydraulic mechanism to the direct drive is effected automatically.

The system comprises a conventional friction clutch located inside the engine flywheel. At low vehicle speeds, say up to 5 m.p.h. in the case of a truck and up to 20 m.p.h. in the case of a high speed passenger car, the clutch is disengaged. Referring to the sectional view of the unit, the driving part of this direct drive clutch *A* engages with a drum *B* secured to the flywheel, while the driven part is secured to the propeller shaft *C*.

Engagement of the clutch is effected by means of centrifugal masses *D* carried by the clutch drum. These masses are forced toward the axis of the propeller shaft by coiled springs *E* at their outer ends, but at a certain speed of rotation the centrifugal force overcomes the spring pressure, the weights move outward away from the axis of rotation and the clutch is engaged.

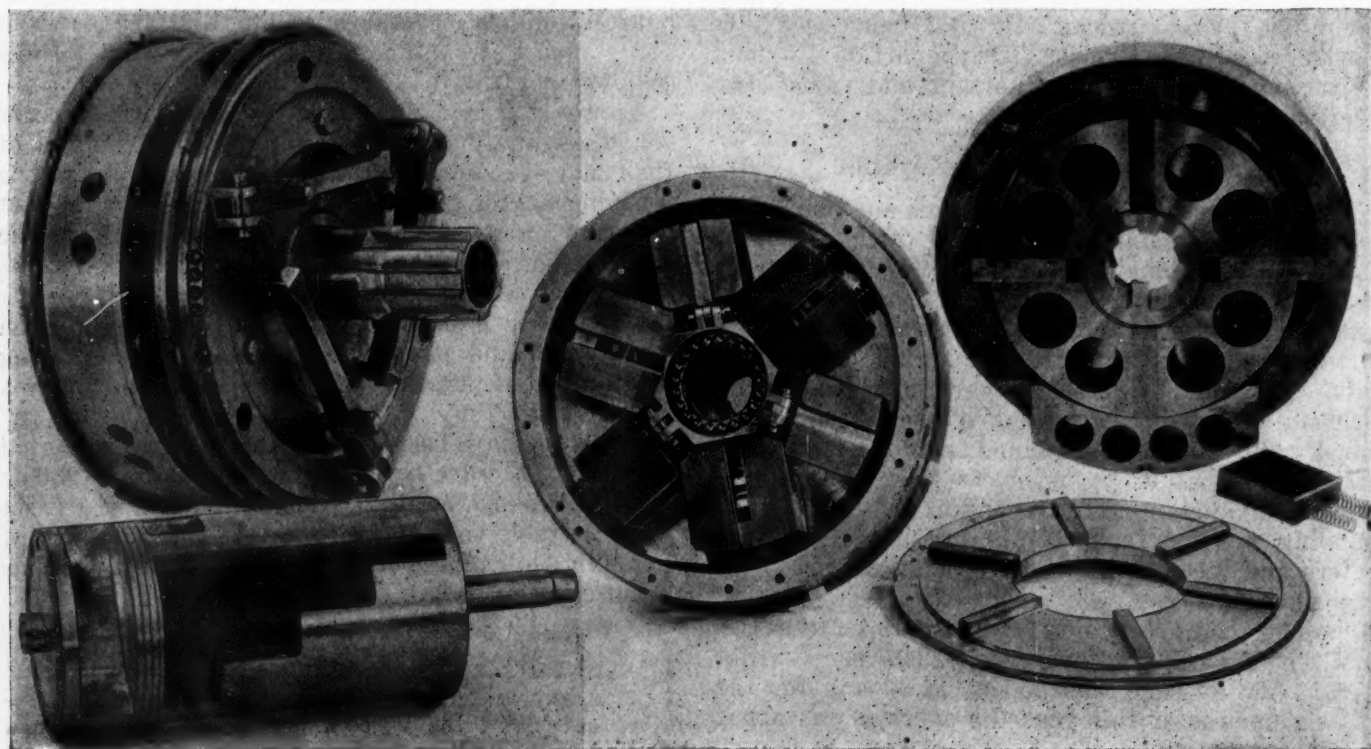
Adjacent to the direct drive clutch and within the same clutch drum on the engine flywheel is located the low speed and reverse clutch *F*. This clutch is actuated by centrifugal weights *G* but in the reverse way to the other clutch; that is, as the vehicle speed increases, and with it the centrifugal force on the clutch masses, this clutch is disengaged. The two clutch governors are so designed that there is a slight overlapping in the action of the two clutches, and consequently no interruption in the drive when the change from indirect to direct drive takes place.

## Hydraulic Mechanism

The low speed clutch serves to connect to the engine a rotary oil pump *H* which circulates a supply of oil by means of which four hydraulic motors *I* are operated. It will be seen from the sectional view that the clutches, pump and hydraulic motors are arranged concentrically, and behind the motors and also concentric with the rest of the parts is a double acting roller clutch *J*.

Adjacent to the oil pump and hydraulic motor and within the same casing is a cylindrical control valve *K* by means of which the rate of discharge and the direction of flow of the oil are controlled.

At low car speeds the engine drives the oil pump through the low speed clutch, and when the control valve is in the neutral position the latter is short-circuited upon itself



Upper left hand corner, clutch assembly; lower left hand corner, control valve for the quadruple hydraulic motor; center, centrifugal governors for the two friction clutches; right, pump with cover removed



(to make use of an electrical term); that is, the oil delivered returns directly to the inlet port of the pump.

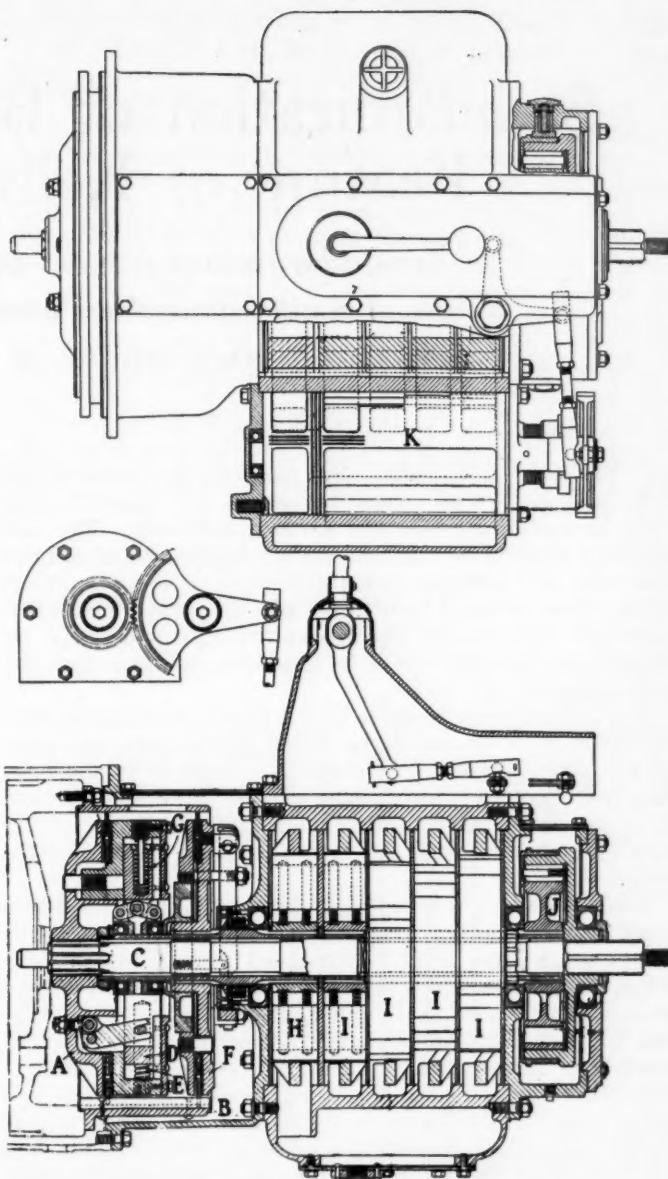
Movement of the control valve in one direction causes the oil moved to pass through all four of the hydraulic motors, setting in rotation the rotors of the latter, which are all keyed or splined to the same tubular shaft. From this tubular shaft the power is transmitted to the propeller shaft by means of a roller clutch. It will be noticed that the displacement of each hydraulic motor is the same as that of the oil pump, and since the four motors are connected in parallel, they will rotate at one-quarter the speed of the oil motor and therefore develop four times the torque (disregarding the loss due to viscous friction, which of necessity decreases the output torque somewhat).

### Torque Control

Further movement of the control valve serves to cut off the supply of oil from one motor after another, with resulting decrease in torque and increase in speed. When the control valve is in the high speed position the motor and propeller shaft rotate at almost the same speed as the engine. After the control valve has been placed in this position the car soon attains the speed in which the clutch masses act to disconnect the oil pump from the engine and simultaneously engage the direct drive clutch. The entire hydraulic mechanism then remains stationary, which is permitted by the over-running of the roller clutch. The direct drive is through the central shaft inside the hollow pump and motor shafts.

In case the vehicle speed and the corresponding propeller speed are reduced to predetermined values, the hydraulic part of the mechanism becomes automatically active, and increased torque can then be obtained or the direction of travel reversed by operating the control valve. For reversing, the oil is passed through the motors in the reverse direction. The roller clutch is double-acting and will transmit power from the driving member for both directions of rotation, but it will not transmit motion from the driven to the driving member.

One of the chief features of this transmission system is that the application of power to the propeller shaft is continuous, without interruption when changing from one speed to another. If desired, the control valve could be operated automatically by means of a governor connected

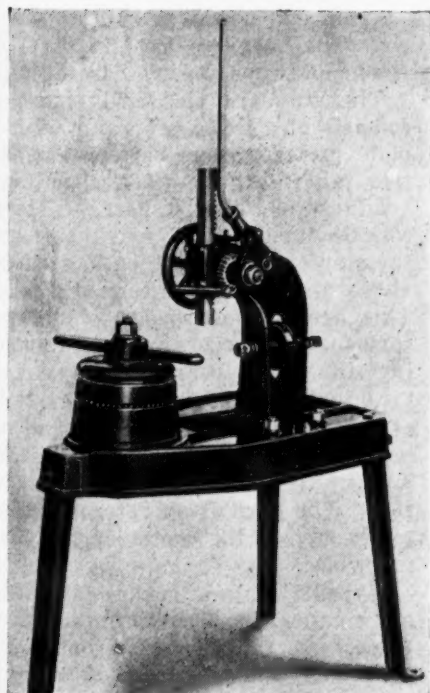


Horizontal and vertical sections through combined clutch and transmission mechanism  
End view of oil pump or motor section

to the propeller shaft or by the pressure developed by the oil pump. Other advantages are that the operation is absolutely silent and that the driver cannot remain in high gear until the engine has begun to labor.

### Prossen Disk Wheel Straightener

THE Prossen disk wheel straightener made by the Nilson-Miller Corp., Hoboken, N. J., consists of a base supporting a turret for holding the wheel and a frame with the necessary mechanism for applying the straightening forces. The turret has one heavy central stud guiding a flanged sleeve corresponding to the hub of a wheel. The end of the sleeve is threaded to receive a wing nut for forcing the free flange against the web or central portion of the wheel. The edge of the lower flange is supported by a large diameter ball bearing so the wheel can be easily revolved while supported rigidly. The frame has a vertical ram provided with an automatic brake. A horizontal jack is supplied for taking kinks out of rims. The frame is held by a clamping arrangement under the base but can be moved freely in or out by releasing two nuts.



Prossen machine which straightens the disks and takes kinks out of rims

## Standardization of Bolt and Bushing Sizes Feature of Kelly-Springfield Line

*Manufacturing cost reduced and production speed increased by use of similar dimensions wherever possible. Two new models announced. Only one set of right and left panels in design.*

**K**ELLY-SPRINGFIELD has replaced its models K-380 and K-39 with newer models of the same 2½ ton capacity known as K-76 and K-75, respectively. The outstanding feature of the new design is the use of similar size bolts and bushings wherever possible and the almost entire elimination of rights and lefts in parts. These features not only lessen the production cost and speed up production, but also simplify the parts stocking problem to a great extent.

The K-75, which replaces the K-39 overhead drive, and the K-76, which replaces the K-380 worm drive, are completely new designs. The greatest change is in the location of the radiator, which is in front of the engine instead of at the rear. All the other models of the Kelly-Springfield line, however, still retain the radiator in front of the dash.

The older trucks had a 5½ in. tapered frame of 7/32 in. stock and the engines were 3⅞ x 5¼ (247.6 cu. in.). The new models have larger four-speed transmissions with 5-7 pitch gears and also larger driveshaft universal joints. The engine sizes on the new models are 4½ x 5½ in., giving a piston displacement of 312 cu. in., an increase of more than 26 per cent.

With the exception of the radiator side panel there are no right and left castings on the truck. The frame is perfectly straight, 7 in. deep, with 3 in. side flanges and ¼ in. stock. The stampings therefore are exactly alike. There are six cross members in the standard length and seven in the long wheelbase truck, the stampings for which are all the same. Top and bottom flanges of the cross members are enlarged to form gussets, while the

face of the cross member is bent around at the end, forming a flap, to obtain a riveting area of generous proportions. The four front spring brackets are all alike. The four rear spring brackets also are alike and the two front spring shackles and the four rear shackles are identical. The shackle bolts are 1⅞ in. in diameter, and there are six of them at the front and eight at the rear, making a total of fourteen to a truck, all alike. The front and rear axle spring clip plates are also the same identical casting, and the clutch and brake pedals are the same.

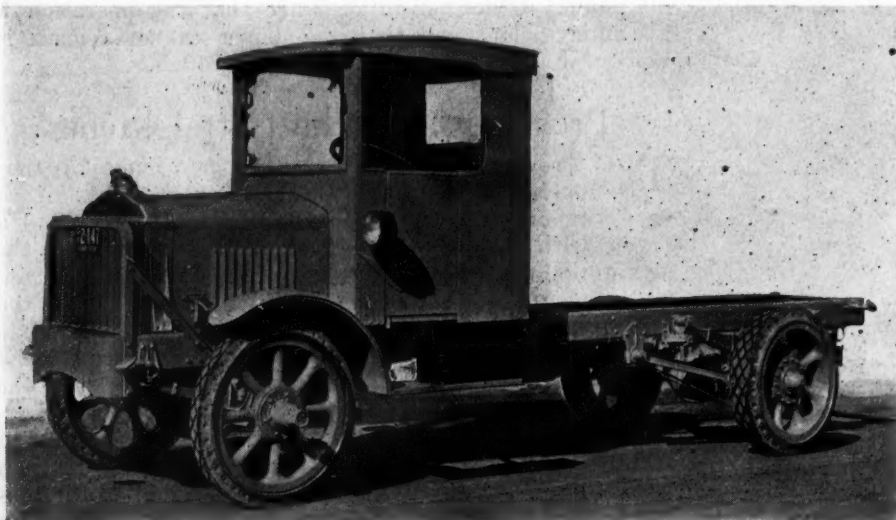
### Driveshaft and Universal Joint

The driveshaft connecting the clutch to the gearset is the same as used in the K-41 3½-5 ton models, and the universal joint assembly is the same as in the K-41, with the exception of the overall length. By reversing the bracket which fastens the steering gear to the dash the location of the wheel in respect to the driver's seat can be altered 2 in.

A heavy coil spring holds down the radiator at each side to allow for the weave of the truck frame. Front and rear spring brackets and shackles are of saw slot and clamp bolt type and the bolts used to clamp these parts are also used to clamp the rocker shaft levers, steering gear trunnion bracket and steering mast bracket, making a total of thirty-six bolts all alike. The frame cross members are so spaced that when the rear end of the frame is cut off for a short frame, the rearmost intermediate cross member comes at the end of the frame and forms the rear cross member. The bushings used in the front and rear spring and front and rear shackles are all alike.

The standard electrical equipment consists of a Delco generator with 19-plate Exide storage battery and electric tail light, ammeter, dash light, headlight and electric horn. A starter can be furnished at extra cost, and the starter button is then located just above the floor board on the dash. This arrangement makes it unnecessary to disconnect wires when removing the floor board. The electric headlights are mounted on the outside of the cab near the front, and the headlight wires run through a drilled hole in the dash, giving full protection. The horn is operated by a button located in the center of the steering wheel.

A radiator guard and substantial oak bumper, armored with ⅛ in. steel, protect the radiator and front end of the truck, and both may be removed



*New model added to Kelly-Springfield line*



by taking out the bolts which fasten them to the frame.

The K-75 has an overhead drive axle of the internal gear type and disk steel wheels, while the K-76 has the worm drive rear axle with wood wheels as standard equipment. Spoked steel wheels are \$30 additional.

The price of either model is \$3,600, from which \$100 is deducted if an open seat is wanted. The chassis weight is 6200 lb. for the K-75, 6300 lb. for the K-76. The body allowance on both models is 1500 lb. and the normal load for both models is 5000 lb. The engine is of the four-cylinder L head type, with cylinders cast in pairs, with a horsepower rating of 28.9.

The intake and exhaust manifolds are on the right side of the engine and are cast in a unit, making an exhaust heated intake with three different adjustments for hot, warm and cold intake pipe. The water pump is of the centrifugal type, and the fan is 18 in. in diameter and driven by a  $1\frac{1}{2}$  in. belt.

Lubrication of the engine is by full pressure system, using a gear type oil pump. The oil pressure is adjustable.

The carbureter is a Zenith  $1\frac{1}{4}$  in. with automatic air cleaning device, while ignition is by an Eisemann magneto. A governor of the centrifugal type is standard equipment. The fuel feed is by gravity from a 25 gal. tank. Water circulation is by a positively driven centrifugal pump and the capacity of the cooling system is 7 gal. The radiator is of the fin and tube type.

The steering gear is of the cam and lever type, the steering column being surmounted by a 20 in. corrugated rim hand wheel. The steering column is on the left side, with throttle lever and magneto lever directly in the center.

The accelerator lever is located on the front floor board. The clutch is of the dry, single plate type, of Borg & Beck make, 12 in. in diameter.

## Rolls-Royce Patents Evaporative Cooling System

**B** RITISH patents covering an evaporative cooling system recently have been granted to Rolls-Royce, Ltd., and John R. Rowledge of Derby, England.

This system differs from others in the same general class in that the pressure in the cylinder jacket is maintained at higher pressure than that which exists in the radiator-condenser through the use of a positive pump which forces water into the jacket against the pressure of a spring loaded valve placed in the outlet line between cylinders and radiator.

In one embodiment of the system a second pump or its equivalent is provided to circulate the water in the jacket for the purpose of avoiding local heating of the cylinder walls, which is caused if steam is allowed to collect in the jacket.

Referring to the accompanying diagrams, it will be noted that the radiator-condenser consists of a water tank below and a radiator above. The latter may be open to the atmosphere, but preferably has a blow-off valve designed to open at a low pressure. The outlet pipe from the cylinder jacket enters the radiator-condenser at a point between the normal water level and the radiating section.

Water or steam can pass from the jacket to the radiator only when the pressure in the jacket exceeds that for which the relief valve in the jacket outlet is set. The water outlet from the radiator tank is connected to a positive pump from which water enters the base of the cylinder jacket at one or more points.

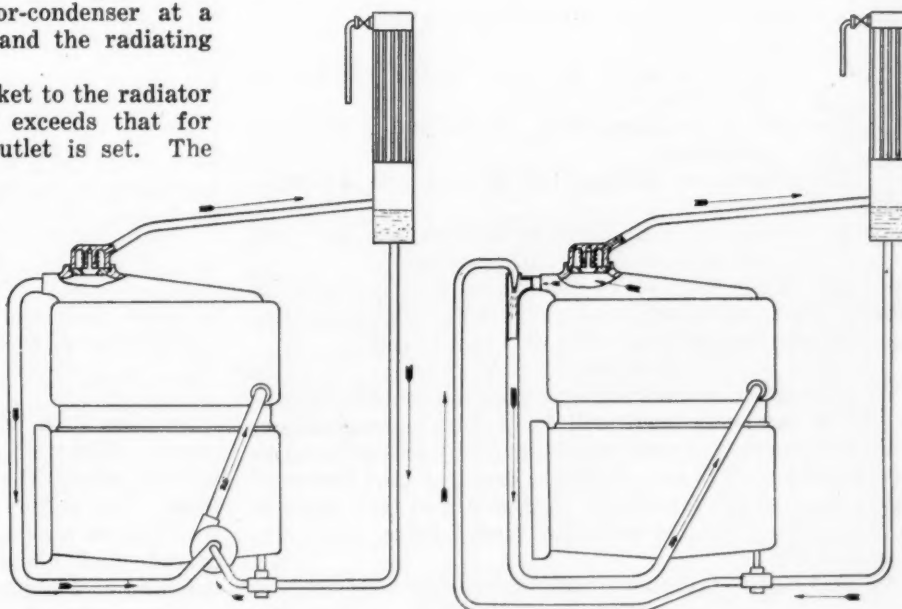
A second pipe leads from the top of the cylinder jacket to a circulating pump which discharges into the base of the cylinder jacket. The pipe from the radiator tank preferably is connected to the suction line of the circulating pump. This is the arrangement shown in Fig. 1.

In another form of the invention the positive pump is made to effect circulation in the jacket as well as to force water from the radiator tank into the cylinder jacket. This may be accomplished, as indicated in Fig. 2, by so connecting the discharge from

the pump as to induce flow from the top of the jacket, using an ejector arrangement such as that shown in the diagram.

Extracts from the patent specifications furnished by Rolls-Royce of America, Inc., make no mention of means for preventing the system from becoming air bound—a difficulty which has given considerable trouble in other evaporative cooling systems.

**A**T a recent meeting of the Joint Fuel Research Committee, representing the N. A. C. C., the N. P. I. and the S. A. E., the effect on crankcase dilution of an increase in the high boiling point constituents of gasoline was discussed. It appears from the investigations thus far carried out that crankcase dilution is the limiting factor in reducing fuel volatility. If this drawback did not exist a considerably larger proportion of crude oil could be made into motor fuel, thus increasing the available supply.



Diagrams of evaporative cooling systems recently patented by Rolls-Royce, Ltd.

# Breaking Up Production Costs Points Way to Real Economies

*Formulas developed for figuring unit costs and the amount that can be spent for special equipment. Quantity production, labor and interest charges to be considered.*

By A. L. De Leeuw\*

**T**HE best machine shop methods are those which give the highest ultimate economy under the existing conditions. This statement of an obvious truth is made here at the beginning of the paper in order to call particular attention to the fact that it is the ultimate economy which counts and not the economy of a single operation, and that some method or methods may be good under one set of conditions and bad, or at least less desirable, under another.

To exemplify: What may be the most economical way of turning a piece when it must be ground is not necessarily the best method when the piece is to be finish-turned. Again, what is the best method of machining when a steady stream of work goes through the factory may not be the best method when the work is seasonal.

Many factors must be taken into consideration when the method of machining of a piece of work is to be decided on, even if the economy of a single operation only is being investigated. When the ultimate economy must be analyzed the problem becomes even more involved.

## Simplest Possible Problem

In order to approach the subject gradually, consideration will be given first to the simplest possible problem, namely, one operation on only one kind of piece. It will be seen that even under these extremely simple conditions there are still several items that determine which method should be followed.

Let  $n$  = number of pieces produced per hour

$w$  = wages per hour

$N$  = number of hours per year during which this operation is performed

$V$  = cost of machine, floor space, and permanent equipment

$p$  = percentage charged for interest and depreciation

$f$  = factor (action) denoting that part of the time the machine is usefully employed.

Then  $fnN$  is the number of pieces produced per year at a direct labor cost of  $wN$ , and  $pV$  is the overhead directly chargeable to the machine. The unit cost is then

$$(pV + wN) \div fnN$$

This formula does not take all possible factors in consideration but lends itself well for a first approximation. It shows at once that unit cost is inversely proportional to  $n$  (the number of pieces per hour) and to  $f$  (the factor of employment of the machine). It shows also that there is no proportional relation with the other factors, namely  $p$ ,  $V$ ,  $w$  and  $N$ .

As unit cost is proportionally connected to  $f$  and  $n$ ,

these factors may be omitted in further analysis. However, they must be considered when computing actual cost.

The formula now becomes: Unit cost is proportional to

$$\frac{pV}{N} + w$$

in which the first term is the machine cost and the second the wage cost. It should be noted here that the machine cost is figured for the number of hours the machine is operating and not for the number of hours it is standing in the shop. This is important when special machinery is introduced.

As an example the following figures are chosen:

$$V = \$8,000$$

$$N = 2400$$

$$p = 15 \text{ per cent} = 0.15$$

$$w = \$0.75$$

$$\frac{pV}{N} + w = \$1.25$$

This \$1.25 is the cost of the operation done when the operator can produce  $n$  pieces per hour, and when he and the machine can be kept busy the fraction  $f$  of the total time. For instance, if the operator works at the rate of 100 pieces per hour but can keep busy only 80 per cent of the time, the unit cost will be  $125 / (0.80 \times 100) = 1.5625$  cents.

Certain factors did not appear in the general formula and may be left out for a first approximation. In the first place, there is the tool expense. This consists of two items, first cost and cost of maintenance—sharpening. Where a certain tool is used constantly for one operation only, these two items can be calculated, and should be if the tool or its maintenance is expensive. Where an operation can be performed in various ways and with different tools, the tool cost may well be the deciding element. However, in all cases this item of expense appears as an addition to the value expressed by the formula. The unit cost  $C_u$  is then

$$C_u = \frac{pV + wN}{fnN} + t_u$$

in which  $t_u$  is the unit tool cost. This unit tool cost is independent of the other factors appearing in the formula.

## Cost of Power

Another item which might be considered is the cost of power. However, power is required whatever machine is used to remove the metal and is in almost all cases a small item. The actual power cost may be fairly great, but if so, it is so because large amounts of metal must be removed—and this is done by heavy machines for which the machine cost per hour is necessarily large.

Still another item is the set-up time. This item modifies the factor  $f$ . This matter is of importance when the job

\*Excerpts from a paper presented at the spring meeting of the A.M.S.E., held in Cleveland, Ohio.



is of short duration; it is of small importance for long jobs and vanishes when a machine is constantly employed on the same work.

For the rest, the factor  $f$  takes care of a number of items such as tool renewal, temporary absence of the worker, etc. In factories where each machine is assigned to a certain job, the factor  $f$  should be determined and should be carried on the record as a constant.

The value of the unit cost as expressed by the formula and its additions can be used to compare the economy of various methods of performing a single operation.

The examples of comparative analysis given in this paper all refer to machining operations on the automobile connecting rod. This piece requires various operations of drilling, reaming or broaching, spot facing, chamfering, tapping, milling and sawing. Later on combinations of some of these operations will be considered; for the present, however, a comparison will be made of various methods which may be employed for some of these operations singly.

As first example the simple operation of sawing the slot at the small end of the connecting rod will be taken. Three cases will be considered, namely, (a) when the quantity is 100, (b) when it is 10,000 and (c) when it is unlimited.

In the first case a machine already available must be selected, the quantity being too small to justify consideration of a machine more especially adapted to the work. This is always true for small quantities, or rather for jobs of short duration. In this case almost any milling machine will do.

#### Method of Calculating

Ignoring tool cost and power cost, the method of calculating is as follows (certain figures being assumed for obvious reasons):

Speed of cut.....	70 ft. per min. (135 r.p.m.)
Feed per revolution.....	0.030 in.
Feed per minute.....	4.05 in.
Time for cut.....	10 sec.
Time for chucking.....	15 sec.
Time for returning table.....	5 sec.

	30 sec.
Time for 100 pieces.....	50 min.
Time for set-up .....	25 min.

Total time .....	75 min.
Value of machines and floor space.....	\$2,000
$pV = \$300$ per year =	\$0.125 per hr.
$w =$ wages	= 0.75 per hr.

$$\text{Total per hr.} = \$0.875$$

$$\text{Total cost of job.....} \$1.095$$

$$\text{Unit cost .....,} 1.095 \text{ cents}$$

The question now is, to what extent, if at all, should this method be modified if the quantity is 10,000 (in one lot and no other lots expected).

The total time for milling and set-up would be  $(100 \times 50) + 25 = 5025$  min. As the cost per hour would be again 87½ cents, the total cost of this job would be \$73.28. This amount is not enough to try to reduce it by a special figure, for, whatever means of chucking may be provided, there will always remain the milling and set-up times which will amount to more than one-third of the total time, so that less than two-thirds of \$73.28 can be saved.

If, however, the job should be recurrent, say, once a year, a special figure might be considered provided there were a fair certainty that the job would last a number of

years. An entirely different problem is presented when the quantity is unlimited or practically so. In this case savings are calculated not on a given quantity but on a year's production.

The productive part of the operation is the sawing. Chucking and manipulation of the machine are necessary but not productive as they interrupt the essential part of the operation, the cutting. As the cutting time is 10 sec. and the total time per piece 30 sec., it follows that the production could be tripled if the non-productive elements could be eliminated or if they could coincide with the cutting. This means that one piece must be cut while another is being chucked.

The most perfect arrangement for obtaining this result is one by means of which the operation becomes continuous, such, for instance, as a rotating fixture, and any such device reaches its highest possible efficiency only when both operator and machine work all of the time. This should not be construed to mean that there shall be no rest for the operator or that he shall be driven, but that the work of man and machine shall harmonize.

#### Checking Up on Results

Testing the case under consideration by this principle and assuming the amount of time for chucking and cutting to be correct as given before, it is found that the following conditions now obtain: Two pieces are chucked in 20 sec. and two pieces are cut in 20 sec. by two cutters on one arbor—there is no idle time. As a result one piece will now be finished in 10 sec. instead of 30 sec. as before.

Under the first plan presented, that is, when a lot of 100 pieces had to be milled, the cost per hour was 87½ cents. An entire year's production at that rate would have cost  $2400 \times 87\frac{1}{2} = \$2,100$ .

Apart from the cost due to special devices introduced in the last plan, the cost of a year's production will be again \$2,100 but the value of the product will be three times as much or \$6,300. It should be noted here that the term "value" does not mean the price charged to the public, but what one department of the shop would charge another.

The additional value obtained permits the purchase of a certain amount of equipment needed for the new method. The amount itself is limited by a number of items, such as the factor  $f$ , the percentage  $p$ , and above all by the probable number of years the special equipment will be used. When this number is small the percentage  $p$  will be large, yet it cannot be said that  $p$  depends upon the number. This is only so when the percentage of depreciation has been increased beyond the normal.

The factor  $f$  gets new significance when special equipment or devices are used. When nothing but standard equipment is used, delays for repairs, etc., do not necessarily stop production as there is generally a duplicate tool or machine at hand. This is not so with special equipment, and an allowance expressed by this factor  $f$  should be made to cover contingencies.

#### Special Equipment Purchases

Considering these various items a formula can be constructed which will show the amount of money which may be spent for special equipment for the performance of single operations. Let

$v$  = value of work in one year by old method

$v_1$  = value of work in one year by new method

if production is uninterrupted

$t$  = estimated number of years

$fv_1 - v$  = gain per year.

$P$  = amount to be spent for special equipment

$p_1$  = percentage of interest charge

Then  $tp_1 \times P + P$  is total amount spent at the end of  $t$

years, and this amount should be less than the amount of gain in that period.

$$tp_1 \times P + P < t(fv_1 - v)$$

$$P \times (tp_1 + 1) < t(fv_1 - v)$$

or

$$P < \frac{t(fv_1 - v)}{tp_1 + 1}$$

This formula applies when the equipment has no appreciable scrap value and cannot be used for some other standard operations.

If the estimated number of years of usefulness is so large that the regular factor of depreciation can be figured, then the formula becomes

$$pP < fv - v$$

or

$$P < \frac{fv - v}{p}$$

### When Cutting Takes Longer Than Chucking

In the foregoing example the chucking time was assumed to be greater than the cutting time. Conditions are somewhat modified when the reverse is true. As an example, the drilling and spot facing of the two bolt holes will be considered. Various elements will be arbitrarily assumed as in the previous example.

Size of hole .....	3/8 in.
Drill speed .....	70 ft. per min. (1130 r.p.m.)
(For the sake of simplicity it is further assumed that a drill press with this speed is available.)	
Feed per revolution .....	0.006 in.
Feed per minutes .....	6.78 in.
Distance to drill .....	1 5/8 in.
Time for drilling .....	15 sec.
Time for chucking .....	5 sec.

(The chucking time is assumed for a simple fixture, consisting of an angle plate, a stud for the large hole, a stud slightly flattened top and bottom for the small hole, and a single-jointed lever with cam hook for clamping.)

If a single drill were used the time for drilling two holes would be 15 + 15 + 5 = 35 sec.

If the cost of machine and floor space is \$1,000, the wage per hour 75 cents, the time for set-up 25 min. and the quantity 100, then the cost per piece is calculated as follows:

Machine cost per hour .....	\$0.0625
Wage cost per hour .....	0.75

Total cost per hour .....	\$0.8125
Time for drilling 100 pieces .....	3500 sec.
Time for set-up .....	1500 sec.
Total time = 5000 sec. = 83 1/3 min.	
Total cost = \$1.13	

$$C_u = 1.13 \text{ cents}$$

### Checking Drill Economy

Leaving for the present the spot facing and chamfering out of the problem, it may be well to see whether and when a two-spindle drill head will be economical. Assuming the cost of this device to be \$100, the question is how many holes must be drilled before this cost is absorbed.

On every piece a gain will be made of 15 sec., the value of which is  $\frac{15}{3600} \times 81\frac{1}{4}$  cents. The number of pieces to be operated on to absorb \$100 is therefore

$$\frac{100 \times 100}{\frac{15}{3600}} = 30,000$$

$$81\frac{1}{4} \times \frac{3600}{15}$$

In addition to drilling there are also spot facing and

chamfering. The most common arrangement for performing such operations is a gang drill in which one spindle is used for drilling, one for spot facing and one for chamfering.

Assuming the time required for spot facing to be 8 sec. and for chamfering 2 sec. with 2 sec. for each movement from spindle to spindle, the total time for the combined operation is found thus:

Chuck .....	5 sec.
Drill .....	15 "
Drill .....	15 "
Move to 2nd spindle .....	2 "
Spot face .....	8 "
Move to 3rd spindle .....	2 "
Chamfering .....	2 "
Move to 1st spindle .....	2 "

Total ..... 51 sec.

The time for set-ups also is increased, say, to 40 min., making the total time for 100 pieces

$$5100 + 2400 = 7500 \text{ sec.} = 125 \text{ min.}$$

The cost per 100 pieces = \$1.69, and

$$C_u = 1.69 \text{ cents}$$

### Working Unlimited Quantities

It remains to be investigated what can be done if practically unlimited quantities are to be worked up, and it should be noted that single operations are no longer being dealt with but with a combination of operations, though of the simplest kind.

The longest cutting operation is 15 sec., and it would be a simple matter to arrange a number of spindles so that all operations were performed simultaneously in that time. This would require a multiple-spindle drill with six active spindles, two for drilling, two for spot facing and two for chamfering. There would be four fixtures, three of them under the spindles and one at the loading position. This arrangement involves an indexing table, which may be operated by hand. If the operation of indexing requires 2 sec., then a piece will be completed in 17 sec. instead of in 51 sec.

However, this arrangement does not give the highest possible economy, for the machine is busy 15 sec. and the operator only 5 (in addition to the indexing). To keep the operator busy it will be necessary to have him load 3 pieces while the machine drills. This would mean that 18 spindles and 12 fixtures are required, while the table indexes to 4 positions. Under these conditions three pieces will be finished in 15 + 2 = 17 sec.

### Increased Production Costs

Under the conditions assumed for the small lot the cost of the operation was 81 1/4 cents per hour, or \$1,950 per year. The output was one piece every 51 sec. while now it is three pieces every 17 sec., so that the output is nine times as large and therefore the value of a year's output has been increased by  $8 \times \$1,950 = \$15,600$ . If there is a fair degree of certainty that the article will be manufactured for two years, then the total gain is \$31,200, and any amount below this sum would be justified for special equipment. However, here again the factor  $f$  should be considered, and furthermore it should be kept in mind that there should be a large margin of profit in sight before such special equipment is purchased. On the other hand, such equipment as has been indicated here is not necessarily strictly special; it may be standard—though not of general utility—so far as the machine is concerned and special in regard to fixtures. It should further be kept in mind that the output of such a plant would be very large indeed and that it might not be kept fully occupied all the time.



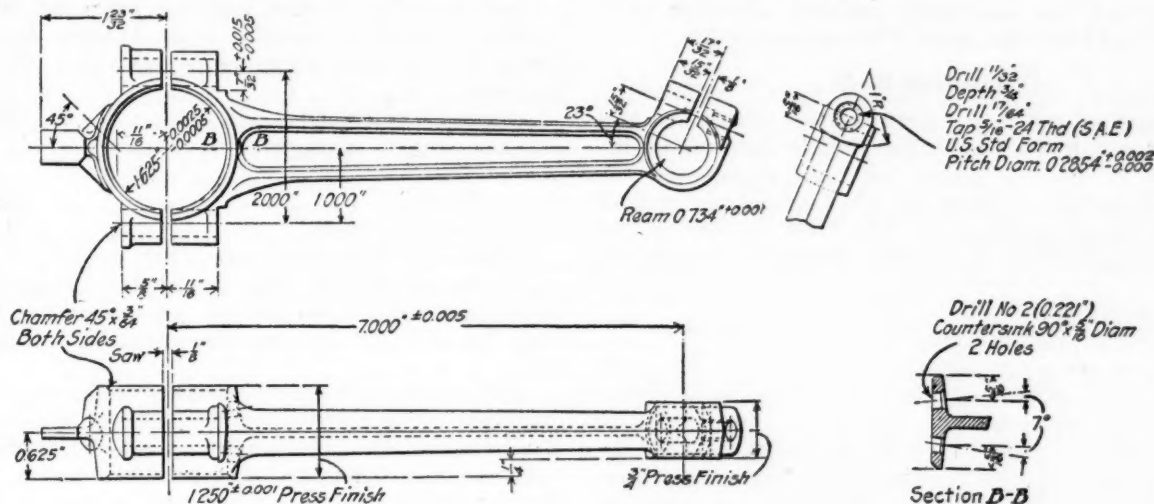
With  $f = 0.80$  the output would be

$$\frac{2400 \times 3600 \times 3}{17} \times \frac{80}{100} = 1,219,800 \text{ per year}$$

The connecting rod shown is a drop forging. The rod and cap are forged in one piece, the sawing apart being one of the last operations. There are two holes to be produced with a rather high degree of accuracy, and there are further a number of minor operations such as drilling, tapping, facing, milling and sawing.

There are two possible ways in which the cost of

Ream large hole.  
Drill small hole.  
Ream small hole.  
Drill two bolt holes (really two operations).  
Ream two bolt holes (really two operations).  
Face top and bottom two bolt holes (really four operations).  
Mill two sides of splashers (really two operations).  
Drill three oil holes (really three operations).  
Drill for binder bolt.



Details of the connecting rod to which the examples cited in this paper refer

machinery may be reduced: by reducing the cost of the individual operations and by combining operations. It is a comparatively simple matter to compare various methods and their costs when single operations are being analyzed. Quantity to be made, equipment on hand, and cost of equipment to be bought are controlling elements, taking it for granted that the necessary skill required for any method under consideration is available.

Operations may be combined for various reasons such as

- To secure greater accuracy.
- To avoid handling.
- For the sake of economy.

### Determining Cost of Labor

No general rule or formula can be given for guidance in an analysis of this kind, but it is possible to find the minimum labor cost if conditions are such that the ideal economy can be reached. In other words, it is always easy to establish an ideal to which we can work and from which we will depart only in so far as practical considerations compel us. Such practical considerations may be cost of equipment or perhaps the impossibility of combining certain operations, such, for instance, as planing and boring.

If the various operations to be done are denoted by 1, 2, 3, etc., and the times required are  $A_1, A_2, A_3$ , respectively, then the greatest possible economy will be reached if all of these operations are performed at the same time, and the time required will be  $A_m$  (that of the longest of all the individual operations).

It should be kept in mind that this refers to the labor cost only. The overhead incident to such a combination may, and often does, wipe out the saving in labor cost. Besides, the cases where it is practical to combine all of the operations are few and far apart. Nevertheless this ideal should be kept in view, and the proper way is to ascertain to what extent it can be realized.

In the case under consideration we have the following individual operations:

Bore large hole.

Drill for tapped hole.  
Tap hole for binder bolt.  
Face hole for binder bolt.  
Saw small end.  
Countersink both sides large end (really two operations).  
Countersink three oil holes (really three operations).  
Saw cap from body.

There are, then, altogether twenty-six operations. It is assumed here that the two main holes are reamed, though they are often broached. This assumption is made so as to avoid unnecessary complications in the problem.

It is quite evident that the longest individual operation is either the drilling of the large hole or else the sawing of the cap from the body. A detail analysis of these two operations would show that the drilling requires approximately 100 sec. while the milling can be done in about 30 sec.

The duration of the longest operation is now established as 100 sec. The ideal scheme, therefore, is the one which provides for the performance of all of the operations in this length of time.

### Advantages and Disadvantages

Before making a study of the conditions which may prevent us from reaching this ideal, the advantages and disadvantages of such a scheme should be considered in a general way; and the engineer or executive considering such a scheme should keep in mind that while a single disadvantage may, at times, neutralize all of the advantages, on the other hand, disadvantages, like troubles, are things which either exist in our minds only or else can be overcome by them.

The advantages are:

- Minimum labor cost.
- Minimum floor space.
- Minimum stock and parts in process.
- Minimum handling.
- Minimum inspection.
- Minimum losses on account of faulty operations.

Maximum accuracy.

Maximum assurance of proper relations of the various elements.

The main disadvantages are:

The fact that special machinery is required.

The cost of equipment.

The low value of equipment in case of disposal.

The uncertainty of the life of the piece.

The fact that breakage of one tool stops all production.

The fact that standby machinery is required.

The fact that the machinery requires attention of a high order, and that the factor  $f$  is necessarily low.

### Connecting Rods

The connecting rod forming the subject of this analysis lends itself well to the combining of practically all operations—that is, from a purely technical standpoint. A machine can be readily imagined which would perform all the operations simultaneously. This fact reduces to two the three items which as a rule should be considered, namely:

The technical possibility.

The technical practicability.

The economical practicability.

When it is stated that all operations can be done simultaneously, it is not meant that all the tools shall work at the same time on one piece, but that a station type of machine could be constructed which would permit of performing all, or almost all, of the operations with one chucking. Such machines are usually built with a turret. A certain number of operations are performed at every position of the turret but one—the loading and unloading position. As a rule, the design of such a machine offers fewer difficulties than that of a standard commercial tool, first, because the machine does not need to take in a wide range of shapes and sizes but needs adjustments only for wear of spindles, slides and tool, and secondly, because they do not have to compete on price.

On the other hand, the building of such a machine requires the highest possible accuracy if the piece of work shall be reasonably accurate, and as this latter point is not always thoroughly understood, an example will be given here to show why this great accuracy is essential in such a turret type of machine.

### Indexing and Work Holding Devices

The turret must index with great precision, and the chucks or work-holding devices in general must all be located in the same relation to the center of the turret and to the index slot.

The piece would be clamped on the circumference of the turret. In the first position the two main holes would be drilled, both sides of the large hole would be chamfered, and the tops and bottoms of the bolt-hole lugs would be straddle milled. In the second position the bolt holes and the binder-screw hole would be drilled and the bolt holes chamfered. In the third position all oil holes would be drilled and the binder-screw hole tapped. The fourth position would take care of the reaming of the two main holes, and the fifth position of the sawing for the binder screw and the cap, and straddle milling the splasher.

The next step is to consider this arrangement from the standpoint of practicability. It is seen at once that to separate the cap from the body in this machine materially reduces the chances for a solid support of the head against the drill. This appears to be of enough importance to warrant dropping this operation.

Countersinking the back of the head also seems to be doubtful. However, a closer examination shows that this operation can be included without danger of affecting the success of the other operations.

The main question remains yet to be answered, namely, whether such a method would be economically sound. Before going deeply into this matter it should be remarked that a machine such as was imagined would be capable of a certain amount of adjustment so that changes in the dimensions and even in the distances of the holes would not make it useless. The construction of the connecting rod would have to be changed in its essentials before the machine would become obsolete. This consideration affects the estimate of the useful life of the machine.

Assuming that a first machine costs \$25,000, that a second or stand-by machine costs \$15,000, and that the useful life of these machines is five years, the following is found:

Cost of machines.....	\$40,000
Five years' interest.....	12,000
Total .....	\$52,000
Cost per year.....	\$10,400

Estimating that there are 2400 working hours in a year, the production will be  $2400 \times 3600/100 = 86,400$  pieces, because it takes 100 sec. per operation. This shows that the machine cost per piece will be a little over 12 cents.

If the quantity to be produced is sufficiently large, this machine cost per piece may be reduced in various ways. For instance, double sets of tools and chucks may be provided so that the operator chucks two pieces instead of one; or that part of the plant may be run on the two or three shift plan, or else the longest operation, the drilling of the main hole, may be split.

### Practicability of Various Methods

The first method is not desirable, partly because it makes the machine too large and complicated, and partly because some of the duplicate tools will be in each other's way. The second method cannot be seriously considered except when other parts of the plant must be run in the same way. The third plan is entirely practical, adds only one station, so that the size of the machine is not much increased, and actually simplifies matters by distributing the tools more evenly. If this third method is followed the machine cost per piece becomes 6 cents.

It may be noticed that the machine was supposed to work all the time, no allowance having been made for tool setting and adjustment. This is proper where there is a standby machine, as one machine can be in production while the other is being made ready. A small percentage may have to be deducted for absence of the operator, and this may be met by considering the machine cost to be  $6\frac{1}{2}$  cents.

Single operations performed according to modern methods, using multiple-spindle drill presses and turntables—in short, methods which compare very well with those used in the most productive shops—bring the total time for these operations up to 333 sec. per rod. The single machine therefore saves 233 sec. per piece or not quite 4 min. Estimating the labor cost at 75 cents per hour, the saving in labor cost would be 5 cents per piece, which is less than the machine cost. Against this the machine cost for the single operations must be figured.

By splitting the drilling operation and thus reducing the time per piece to 50 sec. the saving per piece becomes practically 6 cents, so that even in this case no profit is shown.

If the production requires a piece to be finished every 50 sec. and it takes 333 sec. to finish one by single operations, then there must be more than one set of machines in use; not all the machines, however, would have to be duplicated. This brings the machine cost for the single operations somewhat higher, but not high enough to



justify the building of special machinery with its chance of failure and its almost certain period of development.

If the quantities required are larger, and especially if the life of the piece is certain to be a great many years, another story would be told.

Notwithstanding the fact that the actual machinery cost may not be reduced, there are cases where such special machinery is desirable for the reasons given heretofore and also because present conditions make any method desirable which substitutes machines for men.

That there is little or no final economy in a complete combination of all operations does not prove that there can be no economy in the combination of some of them. In the case here considered it would seem, at a first glance, that there should be some advantage in the simultaneous drilling (and also reaming, if reaming is done at all) of the two main holes. In fact, the comparison made above was between the complete machine and single operations.

If every operation had been done singly, the final result would have been much more in favor of the turret machine. However, before deciding that such a machine should be built, it would have been necessary to consider various partial combinations and the final result would have been the same.

#### Analysis Is Desirable

An analysis of this kind may appear to be a slow and tedious bit of work, but when a factory must give up a considerable part of its floor space and a number of machines and tools for the manufacture of a single piece, and in addition provide a number of men, the management is not justified in selecting a mode of procedure unless it has tested out, at least on paper, all possible combinations. A few days are well spent on such a task.

In estimating the cost of the special machine first cost and interest were both figured, and this is proper, because if the machine had not been built, the fund used for the machine would have been bearing interest through all the years of the life of the piece. On the other hand if we consider the savings made by the use of such a machine as capital returned to the business, this capital also would be bearing interest.

It was found in an earlier paragraph that the cost per year of the special machines was \$10,400, and that the machine cost per piece was 6 cents. It was also found that the saving in labor cost per piece was 6 cents, so that the saving per year was also \$10,400. This profit is made annually for five years, so that the first year's saving bears interest for four years, the second year's saving for three years, etc.—altogether the equivalent of ten years' interest on one year's saving. Assuming, as before, an interest rate of 6 per cent, this would amount to \$6240.

This item of interest on the savings is often overlooked. In this case the item is not large enough to change the conclusion reached before, but where the life of the piece is long the item becomes of considerable importance.

#### Estimated Saving of \$2000 Per Year

As an example, a case will be assumed where it is estimated that special machinery costing \$1,000 will produce savings of \$2,000 per year; and where the life of the piece is estimated to be ten years, without considering the interest on the savings, we would find the following conditions:

First cost .....	\$10,000
Ten years' interest at 6 per cent.....	6,000
<hr/>	
Total cost at end of ten years.....	\$16,000
Saving per year.....	\$2,000
Total savings at end of ten years.....	\$20,000
Profit .....	\$4,000

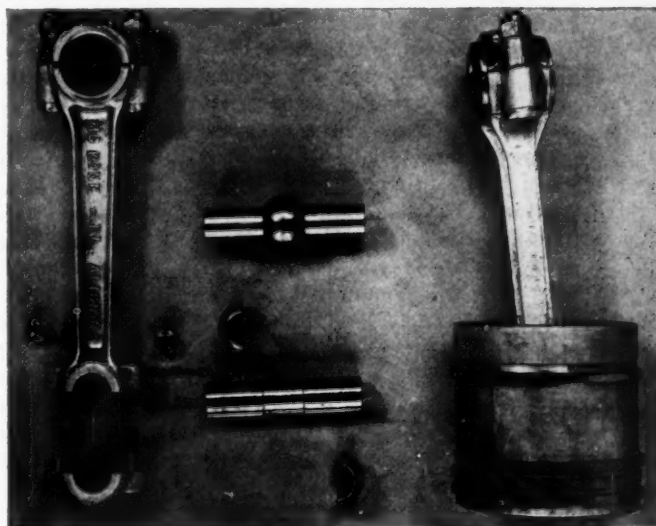
This is too small a profit to justify the purchase of the special machine. However, the balance sheet looks different when the interest on savings also is considered, as it should be.

The total interest on the savings is the interest for one year plus that for two years, etc., up to the interest for nine years. This total equals the interest on \$2,000 for 45 years and amounts to \$5,400, so that the total profit is not \$4,000 but \$9,400, and this may well be enough to justify the purchase of special equipment.

## McKone Connecting Rod Bearing Said to Prevent Binding

A CONNECTING rod with a spherical bearing at the upper end has been developed by Leo J. McKone of Minneapolis, and was demonstrated to drivers and engineers at the recent Indianapolis Speedway race. The object is to prevent binding and consequent wear due to misalignment of the crankshaft, piston pin and cylinder bore.

Three sets of pistons and rods which had been used



McKone connecting rod, assembled with piston and parts

in Ford engines for up to two years were exhibited. One set comprised Kant-Skore pistons and manganese bronze rods, the second iron pistons and manganese bronze rods and the third Dow metal pistons and Baush duralumin rods. The latter assembly, by the way, weighs less than one-third the regular Ford assembly.

Tests with these connecting rods are said to have shown that no trouble is experienced even if a cylinder is bored out of parallelism with the rest, the spherical joint taking care of this.

As may be seen from the illustration, the piston pin is of conventional design, except that a portion at the center is slightly undercut. The ball is made in halves, for convenience in assembling the rod and piston and so as to avoid a loose piston pin bushing, which would be needed if the pin and ball were integral. The pin is slipped into place in the piston, the halves of the ball and the rod and cap are put in place, and the nuts are applied.

Most of the motion takes place at the bearings, of the pin in the bushings, but the ball permits of a universal motion to take care of misalignment.

# Just Among Ourselves

## The Will Rogers Note in Engineering Discussion

**O**PENING a session which was to be devoted to riding comfort at the recent S.A.E. summer meeting, President Henry M. Crane asked: "If balloon tires come, can better springs be far behind?" A little while later O. E. Hunt, General Motors Research Corporation, spoke more truth than poetry when he said that "the idea that brakes can take the place of brains is an entirely mistaken one." Which reminds us that Heywood Broun, the well-known New York scribe, wanted to know the other day how William Jennings Bryan got such a huge reputation for statesmanship by going about the country giving out pompous platitudes when Will Rogers puts more good common sense into one line of his patter in the *Follies* than does the other eminent gentleman in a whole barrel of Chauqua orations.

## Business in Politics and Politics in Business

**J.** D. MOONEY, president, General Motors Export Corp., spoke a few plain truths in addressing the Associated Advertising Clubs of the World in England the other day. His remarks were particularly pertinent, now that the Democratic convention finally has ended and the 1924 campaign is getting into full swing. Mr. Mooney said that "the industrial and commercial leader is to blame for not taking a greater interest in politics; for not using his influence on such legislation as will have an important bearing on the economic welfare of his country. Certainly, if he is to assume the leadership that his fellows expect him to take," Mr. Mooney continued, "he must measure the resistance in every direction, on every front. Then he must create whatever plans

are necessary to make his program effective." The business man usually gets out of politics just about what he puts into them. Think it over.

## How Many Models Are More Than Enough?

**H**OW many models are too many for one car manufacturer to build? More than one factory is faced with that question and nearly every one is answering it differently. Increasing competition and the desire to have a wider selling appeal, of course, are the influences tending to create more models per line. But they are being balanced against the need of the dealer for bigger profits and minimum investment in inventory. The element of style in bodies is becoming more important as a sales feature, according to some executives, and for this reason they believe a greater number of models is justified. There has been a definite increase in number of models in most important lines during the last two years. Of eleven prominent makes, eight had more models in their lines in 1924 than in 1923, three held the number even, while one line dropped its total from three to two. One of the companies which held even in 1923 and 1924 has jumped its total from 14 to 23 for 1925. It takes a bold prophet to attempt to say definitely that the present trend is in the right or wrong direction, but it is something worth trying to find out.

## Duller Body Finishes Get Start in Truck Field

**N**OTWITHSTANDING some authoritative views to the contrary, the dull finish for automobile bodies has made a very favorable impression with a good many people and several important executives in the industry

are enthusiastic about its future. Like all new things, this type of finish will have to go through a period of trial by car owners and will have to work itself gradually into the same social strata with the high luster types which have comprised the "400" of the body finishing world for so many years past. The duller finishes may get a real start in refinishing work on commercial vehicles. Some body distributors and trim shops already are recommending them, especially to those of their customers who want to keep their trucks neat in appearance under severe weather conditions and who want their refinishing jobs done in as short a time as possible.

## The Public and Automotive Tax Cuts

**W**HO is going to get the 2½ per cent which Congress knocked off from taxes on automotive parts? The obvious answer to this question is, "The public." But the matter is not quite so simple as it appears on the surface. Parts manufacturers in many cases have been operating on a narrow margin of profit and have been casting about for some time to find a means of increasing that margin. The fact that business is not very good at present adds another factor to complicate the situation. Congress reduced taxes, however, to lower the cost of parts to the automobile owner. There can be no doubt about that. When the industry goes back to Congress for further reductions on automotive products, Congress will ask: "What did you do with the 2½ per cent on parts?" If it cannot be shown that the tax reduction was passed on to the public, the chance of getting further reductions will not be bright. Legislators may even be heard humming the popular song, "Are You Playing Fair?" And—all selfish and opportunist view-



## More or Less Pertinent Comment on Topics of Current Interest to Men in the Industry

points aside—the public is entitled to get the benefit of the tax reduction in every case possible. The problem is a bit more complex than appears at first glance.

### Open Season for New Models Brings Many Changes

NOW that some of the new models are out of the way, speculation has increased rather than diminished concerning those which are yet to come. Several new eight-in-lines have arrived according to schedule and some more are on the way. Already there has been considerable departure from 1924 models in the new announcements, but few radical changes are to be noted from an engineering standpoint. The effect of balloon tires on steering gear design already is apparent. Study of engineering changes is going to necessitate closer investigation in the future than in the past if more companies should take up the "no-yearly-models" idea.

### "Contemptuous Tolerance" a Foreign Trade Booster

EVERY day some new evidence comes to support the idea that American automotive foreign trade is getting on a firmer foundation every year. The best evidence of this fact, of course, has come in the very practical way of increased sales. These have developed on a sound basis in the last few years, despite the fact that there was a lot of wildcatting back in 1920. But what better critical judgment can be obtained than that of a competitor? Capt. E. A. Rouch, in a paper which won a prize at the British Empire Automobile Conference two weeks ago, told his British colleagues that British manufacturers who have been treating American competition in export fields with "contemptuous toler-

ance" would do well "to concentrate on their home market and leave the export field alone." He said that, despite the fact the American trade had been built up largely through the sale of the Ford car, "a large percentage of American exports consists of a medium priced, well fitted and really comfortable class—which may or may not have been a two-way statement. It's a bit difficult to understand, however, why British car makers should regard with "contemptuous tolerance" or contemptuous anything else a foreign trade in passenger cars which was just about 35 times as big as their own last year.

### Four-Wheel Brakes Get into the Movies

FOUR-WHEEL brakes are getting no very favorable publicity in Buster Keaton's funny film called "Sherlock, Jr.," which is now showing outside the big cities. In this picture Sherlock, Jr., and his sweetheart are fleeing from the villain in a car with four-wheel brakes. We know it had four-wheel brakes because the movie man was kind enough to show a close-up of the tire cover, which announced the fact in big letters. The flying car comes suddenly to the edge of a river; Sherlock, Jr., jams on the brakes. The wheels stop but the body shoots cleanly off the chassis and into the river. It was easy to see that Sherlock, Jr., was a bum detective or he wouldn't have had much trouble in finding a better set of four-wheel brakes.

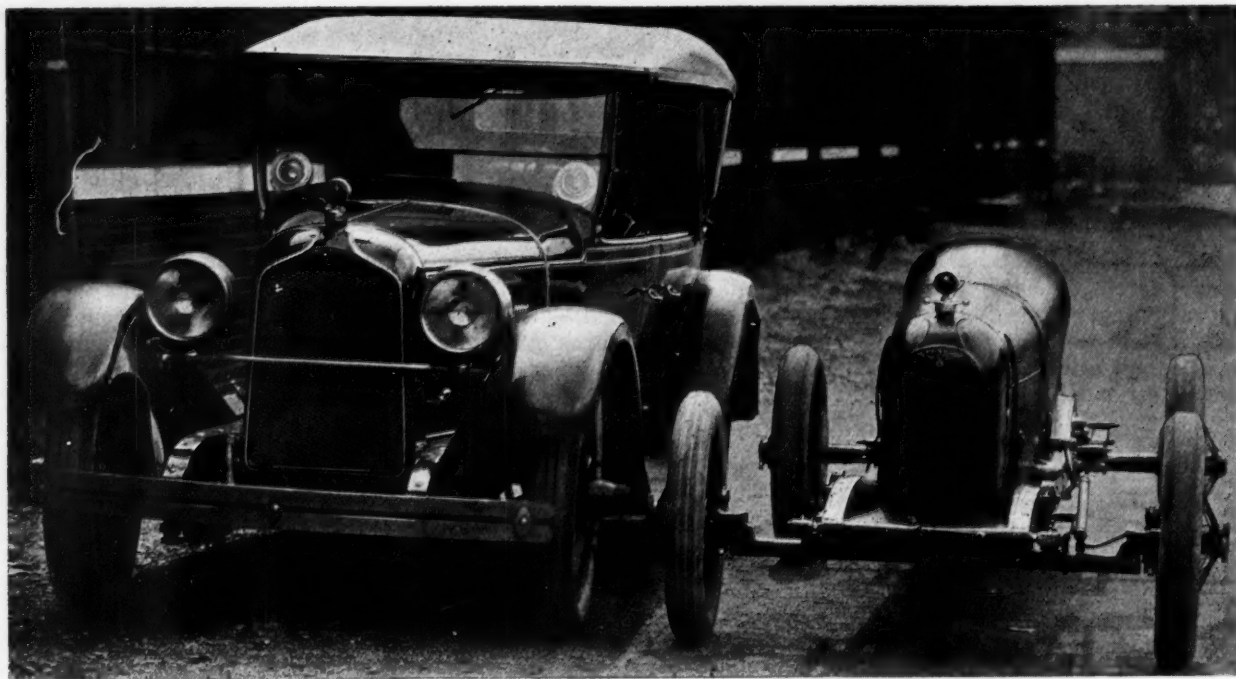
### Truth Is Mighty But Has a Tough Time of It

THE automotive industry sometimes seems worse than an army cantonment as a source for the generation of rumors, many of which haven't the slightest foundation. Auto-

tive men, mingling with business men in other lines, hear almost every day rumors about the automobile industry as a whole or about some particular company which seem almost foolish to those on the inside looking out. Soon these rumors become positive statements and are circulated throughout the business world as facts. It is unfortunate that this is the case, because the automotive industry has been more frank in giving out facts about itself and its policies than almost any other line of business. Such frankness deserves better recompense. Executives in the industry can do a real service to themselves and to the industry as a whole by refraining from spreading unconfirmed gossip and by stating the facts fully in doubtful cases.

### Greatest Good Roads Enthusiast Discovered

MANY people in the industry are in the habit of thinking that Roy D. Chapin and Edward S. Jordan and A. J. Brosseau and some other automotive luminaries are pretty near the top as good roads enthusiasts, but a story has just arrived from Seattle of a man who seems eligible for highest honors. Ezra Meeker, the gentleman in question, is going to run for the Oregon State Legislature at the age of 94 so that he can take an active part in the promotion of good roads in general and in the furthering of a Chinook Pass road project in particular. It seems that Mr. Meeker first got his enthusiasm for better highways by riding across the country in an ox cart back in 1852. He renewed it again when he did the same thing with identical equipment in 1907. Anybody who, at the age of 94, can get excited enough about good roads or anything else of importance in this present vale of tears has our profound respect. N. G. S.



*The Duesenberg stock model and the Duesenberg racer have many points in common despite the great difference in appearance*

## Duesenberg Race Car Resembles Stock Product in Many Particulars

Is much smaller and lighter and has entirely different frame construction, but engine, clutch, gearset and axles are very similar in design and many of same forgings are employed in both products. Supercharger is not needed in large machine.

By B. M. Ikert

**B**Y a process of eliminating certain constructions and substituting for them others, racing cars have been made lighter, faster, easier riding, and have been endowed with a greater factor of safety. This becomes evident from a study of the results of the recent 500-mile Indianapolis race. It will be recalled that the first five of the 122 cu. in. engine cars finished at greater speeds than the old record of 94.48 m.p.h. The new record is 98.24 m.p.h., and the outstanding feature of the race, aside from the smashing of all records, is that the victorious cars had no mechanical troubles worth mentioning and came through the race in excellent shape.

Results of the race show that these small cars were not only the fastest but also the most reliable group of cars that ever raced over the Hoosier oval. Much of this reliability has been secured by proper weight distribution and by proper application of lessons learned from past experience in racing.

Just how much of what has been accomplished on the race track will be reflected in stock car design and construction is a rather difficult thing to determine, but an excellent opportunity is afforded this year to make a direct comparison of the 122 cu. in. Duesenberg racing car, which

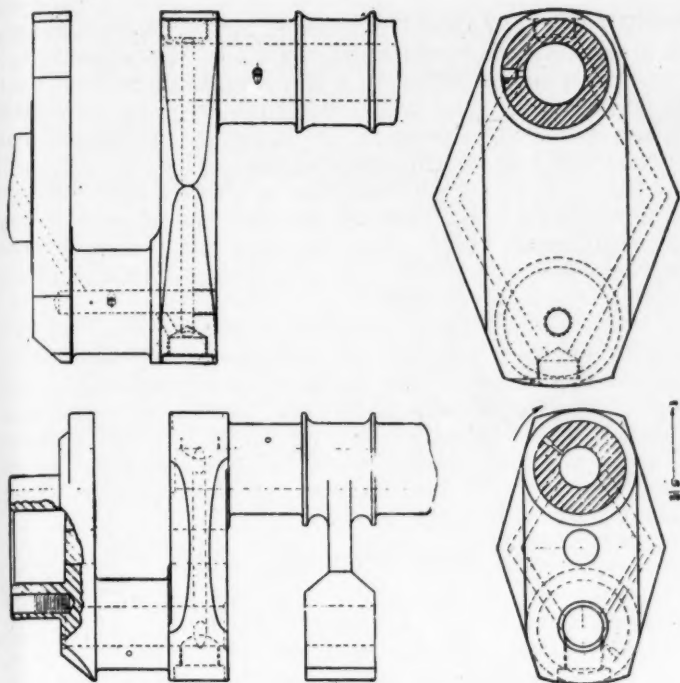
won this year's race, and the stock car of the same name and make, which has a piston displacement of 260 cu. in.

An outstanding difference in the two is that the race car is smaller, this being necessary on account of the 122 cu. in. piston displacement restriction and the 1450 lb. weight limit, which make it necessary that the weight of all parts be minimized.

After making a thorough and almost piece by piece analysis of the constructions and units incorporated in the present Duesenberg stock chassis and that of the racing car, it can be said without contradiction that the race car chassis is built from about 75 per cent stock parts. We do not mean that a majority of parts are interchangeable with those of the stock car, but that stock forgings are used in a great many instances. Often these are simply machined to a smaller size to meet the weight restrictions of the 122 cu. in. race car.

While the stock car has a 134-in. wheelbase, that of the race car is but 100 in. This naturally involves a shortening of the drive shaft and other units, but basically the method of drive and the layout of the units in both chassis are the same. Reference to the accompanying cuts bears out this statement.





*Details of the crankshafts used in the Duesenberg racing and stock cars. The smaller shaft is that of the racing car*

Speed and stamina are the two qualities sought by the race car builder and in their attainment things often are done which would not be necessary in a stock car. The use of a supercharger, for instance, added considerably to the output of the small 122 cu. in. engine used in some of the Duesenberg race cars this year. When these small engines reach 4000 r.p.m. the supercharger becomes very effective. For commercial purposes and with stock engines of over twice 122 cu. in. displacement, the supercharger is not as yet deemed necessary by most car and engine designers.

It is but natural that a concern building both race and stock cars should incorporate certain design features in each type of car which it has found from experience give the desired results.

In the 1913 season one of the drivers of the Duesenberg race cars broke five rear axles. During the winter months following the Duesenberg brothers redesigned the axles, which had been bought from axle makers. The design was changed in several respects to adapt them for racing, but still were far from satisfactory. Finally an axle has been developed which is lighter and meets all the requirements of racing.

#### Light Axles with Hollow Sections

The Duesenbergs attribute present freedom from axle trouble largely to certain design features and to the light weight of the parts. Minimum weight of a unit like the rear axle reduces the tendency for slippage at high speeds, to say nothing of the easier riding and handling of the car by virtue of less unsprung weight.

How this is reflected in the stock Duesenberg car is shown by the fact that its rear axle is said to weigh about one-third less than the axle of other cars in the same class. In addition, Mr. Duesenberg states that owing to the construction of the axle, which has been developed side by side with the racing car axle, it is 30 per cent stronger than stock axles called upon to meet the same conditions. It is interesting at this point to know that no Duesenberg stock car has as yet encountered any difficulties with rear axle breakage.

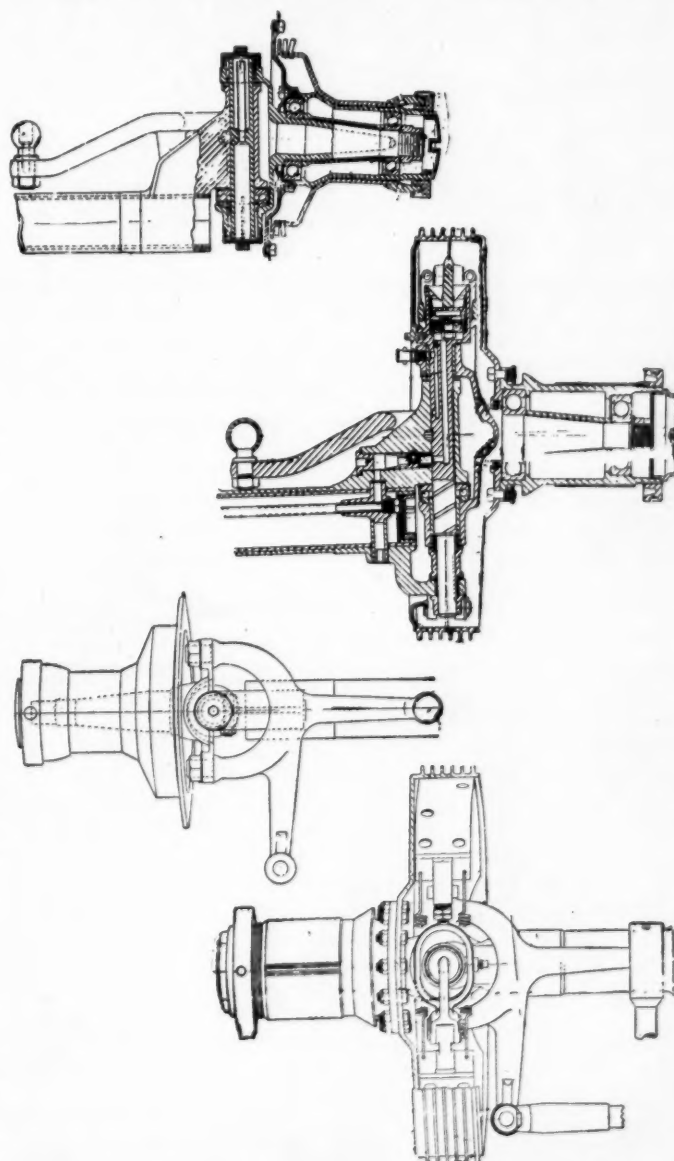
Differences in engine design as between the stock and

race car are chiefly those required by size and weight limitations. For example, the race engine has an aluminum block in which are fitted eight steel liners, whereas the stock engine block is cast iron and without sleeves. The racing engine has two overhead camshafts driven by a chain of gears at the front end. In the stock engine there is a single overhead camshaft, the latter being driven by a vertical shaft and bevel gears.

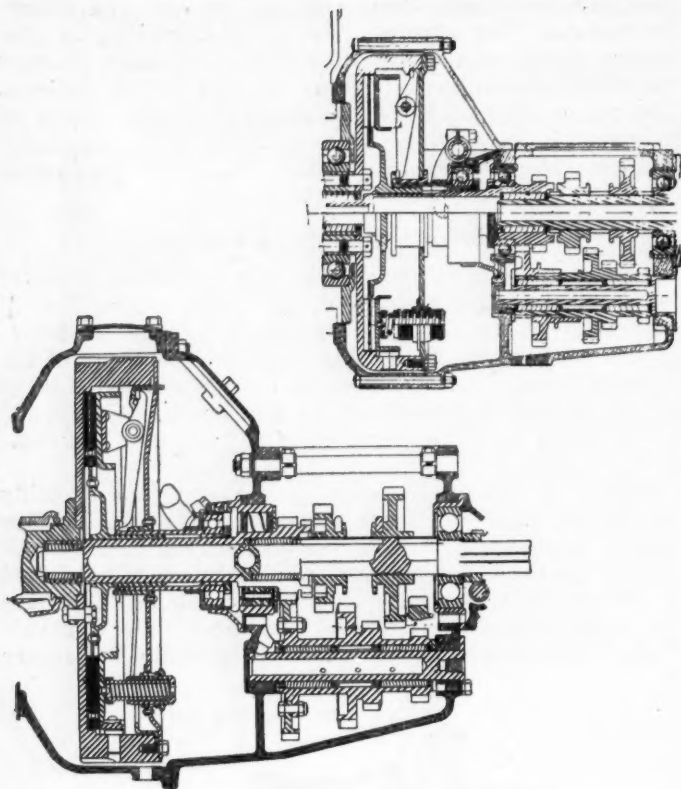
#### Lubrication Systems Similar

Substantially the same lubricating system is used for both engines. In the case of the stock engine the oil enters the crankshaft at three points, whereas it enters at one point in the race engine. In the front end of the cylinder block of the stock engine there is a cored passage which carries the lubricant to the overhead camshaft, while in the race engine an exterior tube does the same thing.

Oil forced through the crankshaft enters the connecting rod bearings. A line leads from the pump to the hollow camshaft, entering the latter at the forward bearing. All of the camshaft bearings are oiled through holes drilled in the camshaft. In the stock engine the oil is forced from the same source in the front bearing of the camshaft through the hollow rocker shaft to lubricate the rocker



*Sectional views of the front axle end and knuckle layout on the racing and stock Duesenberg axle. Steering arms are duplicates*



*Gearset and clutch layout are practically the same. Aside from being smaller, the racing car gearset (upper view) differs from the other in that the countershaft gear is thrown out of mesh when in high*

arm bearings. The oil passes through these bearings onto the cylinder head and drains into a trough where the cams and rocker arm rollers run in a bath of oil. Oil which overflows returns to the crankcase at the forward end, passing over the bevel gears on the vertical drive-shaft, while at the rear it passes through a tube.

The race car engine is lubricated in practically the same way except that modifications have to be used for oiling the ball bearings supporting the crankshaft at the front and rear end. The overhead camshaft gears and drive gears are oiled in precisely the same manner as the vertical shaft gears of the stock engine.

The oil pump of the stock engine revolves at two-thirds engine speed, while that of the race engine revolves at one-half engine speed. However, since the race car engine turns over much faster than the stock engine, the pump speeds are about the same.

Both crankshafts are laid out the same way but the racing engine shaft has two extra counterweights. The cheeks of the throws are the same, as will be noted from the illustrations. Both shafts are carried on three bearings, these being plain babbitt lined bronze backed bearings in the stock engine, while ball bearings are used in the race car engine for the front and rear only, the center being a plain bearing.

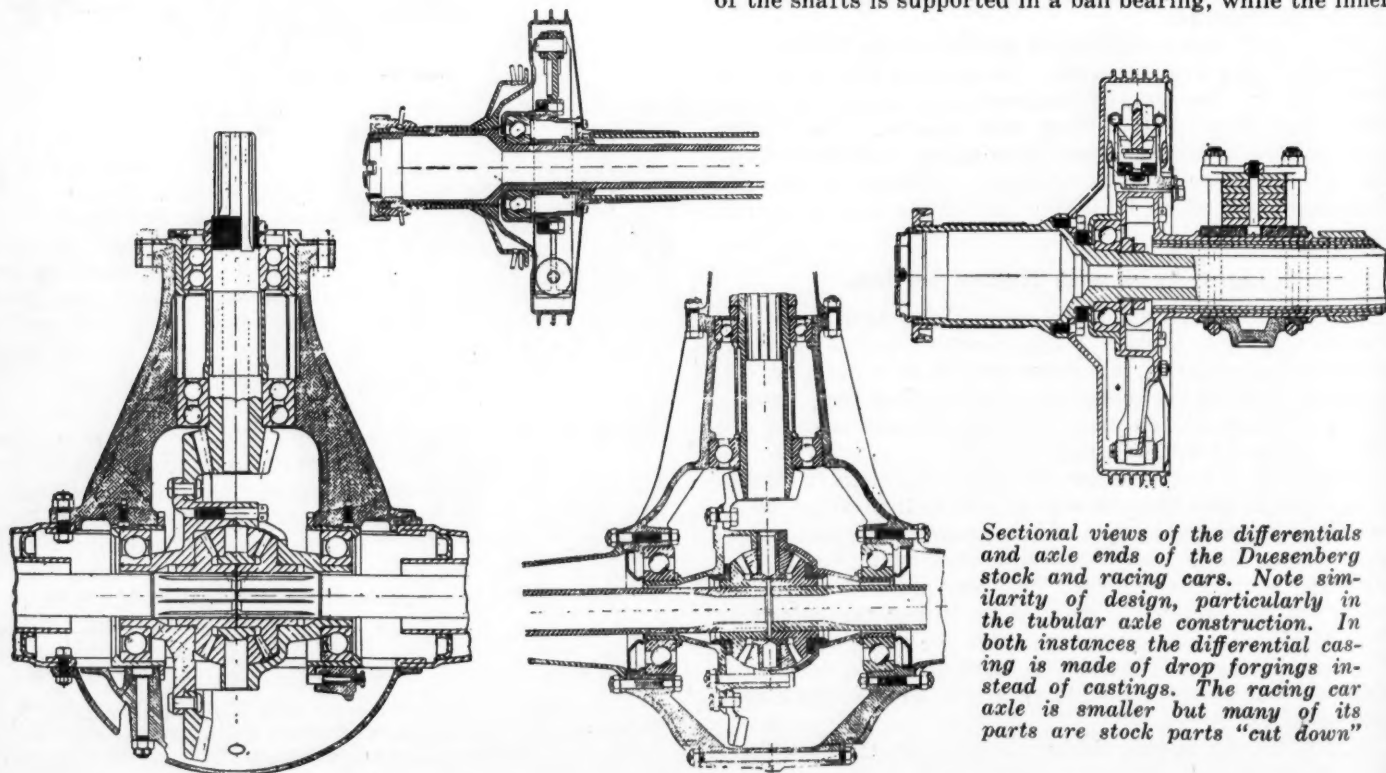
### Flywheel Mountings Differ

There are some differences in the method of attaching the flywheel. This is necessary, owing to the use of a ball bearing for the rear bearing in the race engine. There is, therefore, no flange on the end of the crankshaft of this engine and the cap screws holding the flywheel are inserted directly into the end of the shaft which forms the seat for the inner race of the ball bearing. The stock engine uses a flange on the shaft, as in conventional practice.

Cooling in both cases is by a pump system, the pumps being exactly the same for each engine. The cores in the radiators are identical, excepting that the one in the race car is smaller. Water pumps in the stock and racing engines run respectively at two-thirds and one-half engine speed.

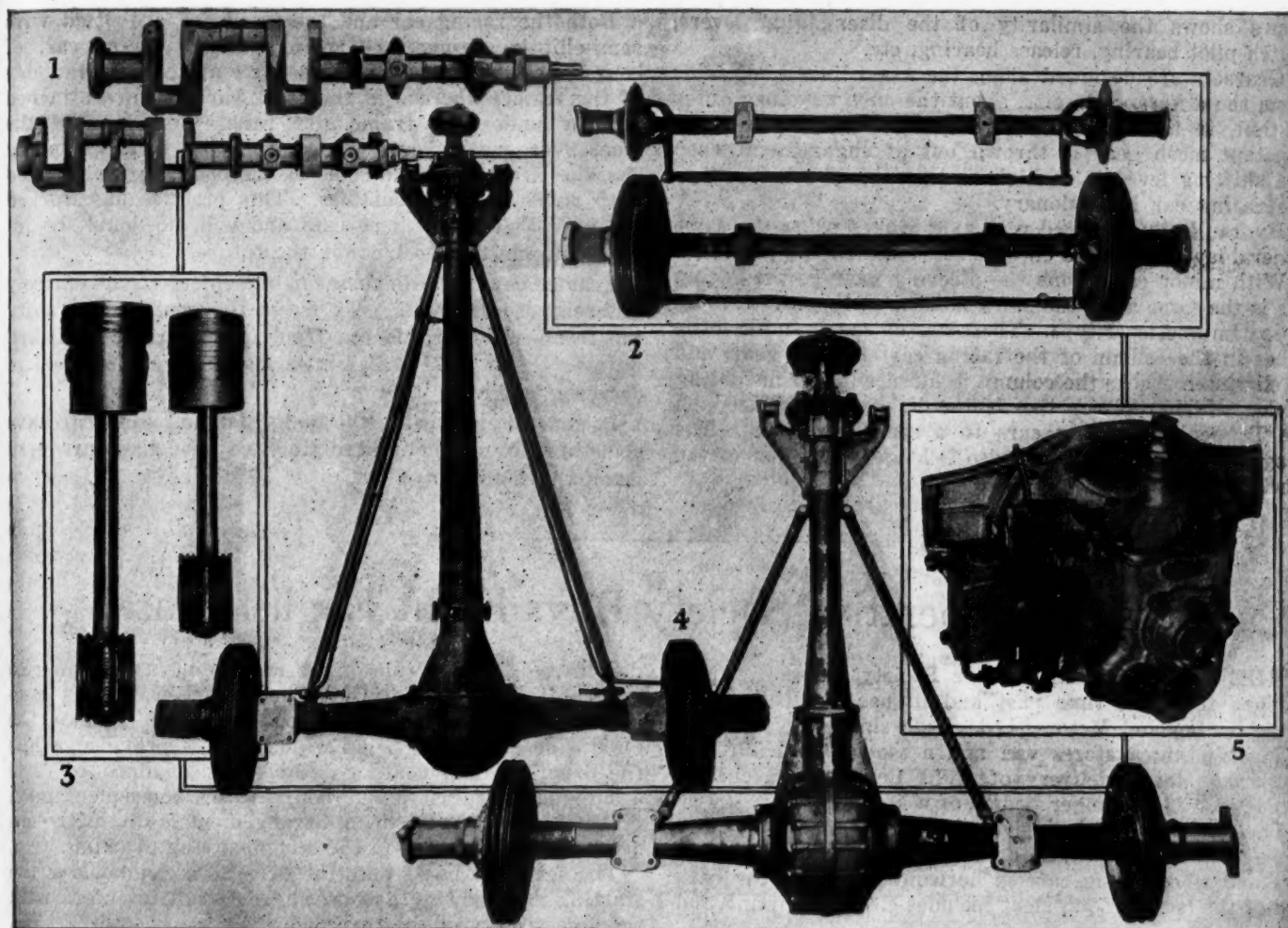
Both engines are three point suspended in the frame and the method of installation is practically identical.

The illustrations of the rear axle used on the stock and that of the race car show the similarity of the two. Both axles are of the semi-floating type. In both cases the axle shafts are tubular and have integral hubs. The hub end of the shafts is supported in a ball bearing, while the inner



*Sectional views of the differentials and axle ends of the Duesenberg stock and racing cars. Note similarity of design, particularly in the tubular axle construction. In both instances the differential casing is made of drop forgings instead of castings. The racing car axle is smaller but many of its parts are stock parts "cut down"*





A photographic comparison of various parts of the Duesenberg racing and stock cars. The smaller part in each case belongs to the racing car. The transmission shown is that of the stock car, the brake cylinder being carried on it in a vertical position, while on the racing car it is arranged horizontally

end is attached to the side gear in the differential by splines.

Differential layout is practically the same in both axles and the manner of mounting on ball bearings is identical. The ring gear carrier of the racing axle, while smaller, is made from a stock part and is bolted to the carrier, while in the stock car it is riveted. The stock axle also is provided with an adjustment for getting the proper mesh of the ring gear and pinion, but there is no adjustment in the race car axle.

### Rear Axle Features

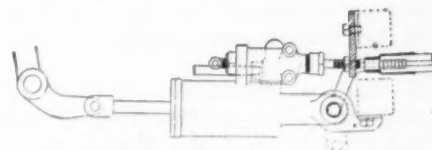
Both the pinion shaft of the race car and stock car are mounted on ball bearings in the same manner, with the exception that a double-row bearing is used in the stock car. Both pinion shafts are hollow to save weight and in the race car the shaft is made with splines on the inside, whereas the splines are on the outside in the stock car pinion shaft. A spacer of the same type is used between the two bearings of both pinion shafts in both cars.

Both rear axles employ radius rods, while driving and braking reaction is through a torque tube which is flange mounted to the rear axle housing in the same manner in both cases. The yoke at the forward end of the torque tube is practically the same in each case, differing chiefly in the material used, that of the race car being an aluminum alloy while steel is used in the stock car. Reference to the illustrations of the two axles shows also that the universal joint layout is identical, there being two in each case.

About the only difference here is that, in the race car, the propeller shaft brake is placed behind the gearset, while on the stock car it is incorporated within the yoke of the torque tube. Housings for the rear axles differ chiefly in that the one of the race car is a built-up type, while a banjo type is used for the stock rear axle.

In the front axle we find an absolute duplication in the steering arms, as shown by the accompanying illustrations. The Duesenberg racing cars of this year used stock forgings for these parts and the ends of the axle tube supporting the knuckles are stock parts machined to smaller dimensions. The wheel bearing layout is the same in both front axles even to the thrust bearing of the kingpins. The race car is not equipped with brakes on the front wheels and consequently the layout of the stock axle which carries

Arrangement of master cylinder on racing car



hydraulically operated brakes is somewhat different to provide for the extra mechanism.

Excepting for size, the clutch and gearset layout of the racing car and stock car are the same. As in many of the other units, we find that some of the clutch parts are made from stock parts machined to a smaller size. An example of this is the clutch driving hub. Both clutches are of the dry plate type and reference to the sectional

views shows the similarity of the disengaging levers, clutch pilot bearing, release bearing, etc.

Gearsets are designed along the same lines and, aside from the difference in size, about the only way they differ is that, in the racing car, what is commonly called the constant mesh gear is thrown out of engagement when the shifting lever is in high so that the countershaft of the racing car is stationary.

Hydraulically operated rear axle brakes using the same general layout are used on both stock and racing models.

With minor exceptions the steering gear of the racing car is the same as in the stock model. Both gears are the Ross cam and lever type. There are no spark and throttle tubes in the column of the racing car steering gear, and to eliminate shocks the column is fitted with an insulating device which replaces the fabric disk formerly used on the Duesenberg racing cars to absorb vibrations. The drag link of the racing car also is longer than that of the stock model.

Both the racing car and the stock car are fitted with semi-elliptic springs, the springs of the racing car, of course, being smaller. They also are attached to the side of the frame, whereas in the stock car they are attached directly under the frame side rails. On some of the Duesenberg racing cars the conventional form of spring shackles are used while some of the other cars are fitted with rubber shock insulators. This practice has worked out very well on the race cars and will, no doubt, be incorporated in the stock car in the future.

Frames have little in common, due chiefly to the entirely different requirements. To lower the center of gravity the frame is lower and the front of the frame is kicked up over the axle. Duralumin is used in place of steel to decrease weight.

In general appearance the racing car and stock car have something in common. Radiator and hood lines are very much the same.

## Russian Cooperative Society Buys Eight English Buses

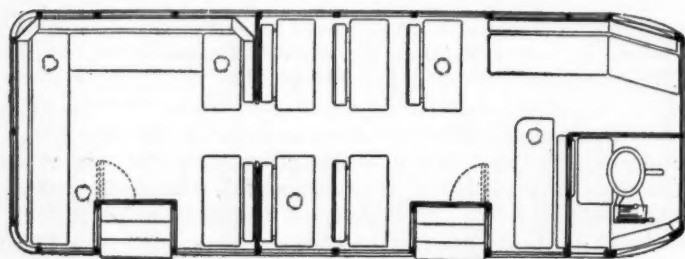
**T**HE All-Russian Cooperative Society, Moscow, which has for some time past had in use thirteen trucks made by Leyland Motors, Ltd., Lancashire, England, the fleet including a stores van and a mobile workshop, recently has taken delivery of eight Leyland bus chassis fitted with 29-passenger bodies of a special type.

These eight vehicles have 1085 x 185 mm. pneumatic tires, twin at the rear, on detachable disk wheels, a spare tire and wheel being carried horizontally under the back end of the body. Equipment includes electric starting and

despite the Russian rule of the road being as in America and contrary to that of England, the driver, who is completely isolated from the passengers, has his seat on the right side. A quarter-fold windscreen is provided, while the usual Leyland floating dashboard is claimed to form a safeguard against undue body strains consequent upon frame flexure. The seating arrangement is distinctly unorthodox, as indicated in the accompanying drawing.

The seat that backs onto the driver's accommodates the starting and lighting battery and does not interfere with the accessibility of the trap door over the gearset.

All the main side windows are made to drop; they are spring balanced, and a separate blind is fitted to each, while the transverse windows that form the side of the entrances are provided with draw curtains.



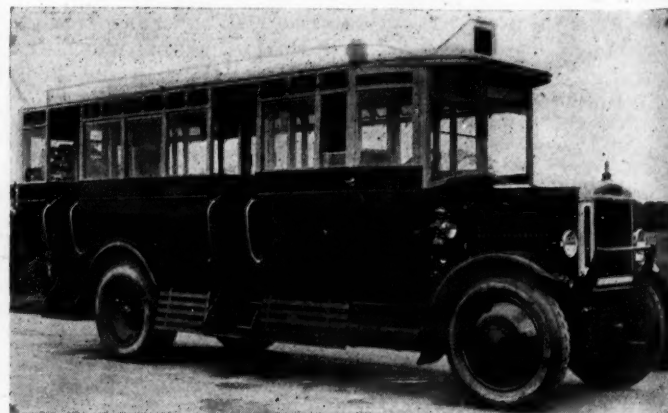
*Plan of body on Leyland chassis. Driver is seated in a separate compartment. Note unusual arrangement of seats*

lighting units and a power-driven tire pump. The interior of each body is exhaust heated, a T-fitting and two-way valve being inserted in the exhaust pipe just in front of the main muffler; by this means the hot gases can be diverted through a vertical pipe to one which runs along the whole length of the body interior on the left and transversely across it at the rear, terminating in a special external muffler attached to the rearmost cross member of the chassis.

Bodies have two doors for the passengers, both on the right hand side, of the double folding type set deeply within the body sides, with three steps and dual hand rails. The roof is surmounted by luggage rails and netting, with a permanently fixed ten-run steel ladder at the rear for loading and unloading, while at the front end is a protruding tapered box to hold the illuminated route numbers, which consist of stenciled plates inserted from the driver's compartment. Destination indicators also are provided at front and rear.

The driver's compartment has a separate doorway approached by two steps behind the right front wheel, for,

**I**N the electric brass melting field, the United States has attained a tremendous lead over all foreign countries. Whereas in this country there are about 540 active electric furnaces doing commercial non-ferrous melting, it is doubtful whether all other countries combined use 100 electric brass furnaces. Of the American furnaces, about 275 are induction furnaces, about 135 are moving indirect arc furnaces, 80 are Bailly furnaces, while the remaining 50 furnaces are of various types.



*Leyland bus designed for use in Russia. Two entrance doors, side fenders and space for luggage on roof are among unusual features*



# Modifications of the Fatigue-of-Metals Theory Formulated

*In a new bulletin published by the University of Illinois conclusions drawn from extensive researches on the subject at the Engineering Experiment Station and elsewhere are summarized and an extension of the theory is attempted.*

THE research work on the fatigue of metals, which is being carried on at the University of Illinois Engineering Experiment Station, is already well known, two bulletins detailing the progress of the work having been published some time ago. A new bulletin (No. 142 of the Engineering Experiment Station) has now been issued, in which the formulation of an extension and modification of the previously accepted theory of the fatigue of metals is attempted. This later bulletin therefore differs in character from the earlier ones, which were devoted chiefly to an experimental study of fatigue phenomena.

The fatigue of metals is defined as "the action which takes place in metal parts subjected to repeated stress which causes failure of the metal at stresses well below the static ultimate strength." In a general way this definition is no doubt correct, but we can hardly agree that fatigue is an action, and instead of saying "an action which takes place" we think it would be preferable to say "a state induced."

## Conclusions Based on Evidence

At the end of the bulletin are given conclusions based on the experimental work done up to date both at the Experimental Station and elsewhere. The following ten paragraphs give a summary of conclusions which are based on direct experimental evidence:

(1) Additional evidence of the existence of an endurance limit for wrought ferrous metals is furnished by the results of re-tests of specimens which have withstood millions of cycles of stress without failure. Such re-tests not only failed to give evidence of damage to the metal by the millions of cycles of understress, but actually showed an increase of resistance to further repeated stress. This strengthening effect was most marked for those steels which are susceptible of improvement in static strength by cold working.

(2) Repeated stress at or below the original endurance limit of a wrought ferrous metal raises the endurance limit for that metal. A few cycles of repeated stress above the original endurance limit of a wrought ferrous metal lowers the endurance limit for that metal. A wrought ferrous metal injured by such overstress may have its strength partly, but rarely wholly, restored by polishing its surface or by repeated stress below the endurance limit. The static strength of a wrought ferrous metal is increased in the same general way as is the endurance limit, by repeated stress below the endurance limit.

(3) Under cycles of alternate axial tension and axial compression (completely reversed axial stress) specimens of wrought ferrous metals gave endurance limits averaging 64 per cent of the endurance limits for the same metals under cycles of reversed flexural stress. Probably the lower value found for the endurance limit under reversed axial stress is partly due to uneven stress-distribution in the short axial-stress specimens

used. However, the stress-distribution in these specimens would in all probability be as regular as the stress-distribution in machine parts subjected to nominal axial stress. It is, accordingly, tentatively recommended that the endurance limit of wrought ferrous metals under reversed axial stress be considered as 60 per cent of the endurance limit under reversed flexural stress.

## Tensile Strengths and Endurance Limits

(4) The static tensile strength and the endurance limit of wrought ferrous metals were found to be lower for specimens tested across the direction of rolling than for specimens tested along the direction of rolling. Test results for a number of specimens of wrought iron and of 0.37 per cent carbon steel indicate that the effect of the direction of rolling on the endurance limit is fully as great as the effect on the static ultimate tensile strength.

(5) Test results for 48 specimens of 0.37 per cent carbon steel cut from a 4-in. billet and subsequently heat treated indicated some relative improvement of the strength of specimens tested across the direction of rolling as compared with specimens tested along the direction of rolling. The use of heat treating to improve the strength of steel across the direction of rolling is a problem worthy of further study.

(6) The endurance limit and the static strength of very low-carbon steel (ingot iron, 0.02 per cent carbon) were raised appreciably by heat treatment (a water quench) though the effect was much less marked than in the case of high-carbon steels and of alloy steels.

(7) For wrought ferrous metals the endurance limit for cycles of reversed shearing stress is about 53 per cent of that for cycles of reversed flexures. The endurance limits for reversed shearing stress were determined by tests of specimens under cycles of reversed torsion.

(8) Preliminary tests on specimens of annealed copper, annealed brass, annealed bronze and hot-rolled monel metal have not yet determined that these metals have an endurance limit. If such a limit exists it may be necessary to carry fatigue tests to hundreds of millions of cycles of stress to determine it.

## Equations for Stresses

(9) For flexural stress or for axial tensile stress either one of the following equations gives safe values of endurance limit for wrought ferrous metals under cycles of partially reversed stress or of stress varying from zero to a maximum:

$$S_r = S_t \frac{r+3}{2} \text{ or } S_r = S_t \sqrt{\frac{2}{1+r}}$$

in which  $S_r$  is the tensile unit-stress at the endurance limit for the range of stress represented by  $r$ ;  $S_t$  is the tensile strength unit-stress at the endurance limit for completely reversed stress; and  $r$  is the ratio of mini-

mum stress to maximum stress for a cycle of stress. Data are lacking for determining the endurance limit for cases in which  $r$  is positive.

(10) For shearing stress the best data available indicate that for the wrought ferrous metals tested the endurance limit for cycles of stress varying from zero to a maximum is nearly twice the endurance limit for cycles of completely reversed stress. In the absence of more complete data it may be noted that equations corresponding to those given in the preceding paragraph give results which are on the safe side for repeated shearing stress.

#### Probable Conclusion

No direct experimental evidence is available in support of the following conclusion, but it seems to be in general accord with observed phenomena:

(11) It seems probable that the short-time test for determining endurance limit by the rise of temperature of a specimen subjected to some hundreds of cycles of reversed stress and the short-time test for determining endurance limit from the load-deflection diagram for a rotating beam determine the beginning of appreciable slip within the crystalline grains of the metal rather than the beginning of fatigue fracture. For wrought ferrous metals, however, with a Brinell hardness number less than about 375 this slip takes place under stresses at or slightly below the endurance limit, and these short-time tests seem safe tests for determining the endurance limits for such wrought ferrous metals if they are reasonably free from inclusions and flaws. In the absence of conclusive test data these short-time tests should not be regarded as safe tests for determining the endurance limit of cast metal or of non-ferrous metals.

#### Extension and Modification of the Theory

The following three paragraphs summarize the statement of a theory of the fatigue of metals which may be regarded as an extension and modification of the well-known theory that fatigue failures in metals start from slip planes within the crystalline grains:

(12) In this bulletin the general discussion of the fatigue phenomena of metals has been based on the con-

cept that fatigue failure starts at some minute region of high localized stress and that its beginning is a tearing apart of minute pieces of metal. Fatigue failure proceeds by the spreading of the minute fissures thus formed. These fissures may be, but are not necessarily, the sequel of slip along cleavage planes within the crystalline grains of the metal.

(13) There is presented the further concept that repeated stress produces in a metal both strengthening effects and destructive effects. The strengthening effects are held to include the improvement of bearing between adjacent crystalline grains or other small particles of metal. The destructive effects are held to consist in the actual tearing apart of particles of the metal with the consequent formation of minute cracks, which have a tendency to spread.

#### Wrought Ferrous Metal

(14) There is presented the further concept that for wrought ferrous metals the strengthening effects overbalance the destructive effects for cycles of stress below a fairly well-defined limiting stress, but that above this limiting stress the destructive effects predominate and failure occurs if the stress be repeated a sufficient number of times. This limiting stress is the endurance limit of the metal. The following conclusion is based on direct experimental evidence (microscopic examination of metal structure) and on a general study of the phenomena of mechanical tests of metals. It states a fact long since familiar to the careful student of the mechanics of materials but often overlooked by the casual student.

(15) The ordinary formulas of mechanics of materials are based on assumptions of homogeneity of material and of regularity of stress-distribution throughout the material, and these assumptions imply a much simpler condition than actually exists in metals and other materials of construction. However, these assumptions give a picture of stress-distribution which may be regarded as accurate in a general, statistical way. Even in the case of progressive failure under repeated stress the ordinary assumptions and formulas of mechanics of materials are found useful.

### Automotive Shipments for April, 1924, from Canada

Countries	Cars			Parts	Trucks
	Up to \$500	\$500 to \$1000	Over \$1000	Value	Up to 1 Ton
<b>Europe</b>					
Belgium.....		10	1	\$5,515	
Denmark.....		6		23,243	
Germany.....	51	30	30		
Irish Free State.....				6,043	
Malta, Gozo and Cyprus Islands.....	2	1			
Netherlands.....		1	2		
Norway.....		1			
Poland.....		2	2		
Spain.....	2			7,188	
Sweden.....		18	7		
Switzerland.....		1	6		
Turkey.....	10		1		
United Kingdom.....	48	27	51	52,852	96
<b>North and South America</b>					
Costa Rica.....		2	3		
Guatemala.....			3		
Salvador.....		2			
Mexico.....		11	9		
Newfoundland.....		3		1,472	
Barbados.....		5			
Jamaica.....	9		2		
Other British West Indies.....	2	1			
Dominican Republic.....		1			
Argentina.....	50	67	40	80,633	
Bolivia.....		2	1		
Brazil.....		7	27	7,467	
Chile.....		6			
<b>Colombia</b>					
Colombia.....		2	2		
British Guiana.....	8	3			
Uruguay.....	10	3	3		
Venezuela.....		5	6		
<b>Asia</b>					
Aden.....	10				
British India.....	150	52	1	12,454	121
Ceylon.....	6	10		798	
Straits Settlements.....	50	18	1	3,493	48
China.....			3		
Dutch East Indies.....	38	2	4	3,802	
Japan.....		20			
Palestine and Syria.....	2				
Siam.....	5				6
<b>Oceania</b>					
Australia.....	252		51	11,312	84
New Zealand.....	238	288	70	181	
<b>Africa</b>					
British West Africa.....				2,945	12
British South Africa.....	194	87	13	187,856	
British East Africa.....	64	2		4,686	36
Morocco.....	7		1		
Portuguese Africa.....					
Other Countries.....	23	16	10	1,094	2
Fiji.....				562	
<b>Total</b> .....	<b>1,233</b>	<b>713</b>	<b>351</b>	<b>\$393,596</b>	<b>405</b>



# What Automotive Engineers Can Get From Field Contacts

Technical knowledge is not enough since merchandising has become so large a part of the automobile industry. Problems of man who drives and cares for his own car vital.

**J**UST as the manufacture of a car involves a lot more than the mere work of hands and tools so does automotive engineering mean something more than slide rules, stresses and strains. Too often the significance of the term engineer, particularly the automotive engineer, has been too closely identified with the literal substance of the engine rather than the true sense of the calling. The truth of this statement is demonstrated to the fullest extent by the present, belated interest in automobile bodies and body finishes. While these details of construction have always been an intrinsic part of every finished automobile, they have been sadly neglected and overlooked due to concentration on the engine and other mechanical parts that fitted into the scheme of engineering of forgings, castings and stampings.

Two very interesting definitions of the term engineer are given by Noah Webster: "One who contrives; an inventor, also a plotter. One who carries through an enterprise by skillful or artful contrivance; an efficient manager." The first covers the good old-fashioned idea of the engineer with his mysterious calculations and learned discussions of theory, and more than one customer or repair man will testify that as a plotter the engineer ranks with Guy Fawkes. Nevertheless, this portion in its truer sense, ingenuity, is a salient part of the make-up of every engineer. In the early days of the era of machinery and as recently as fifteen years ago in the automotive industry, invention was the chief function of the engineer, but with the spread of automobiles and other manufactured articles of all kinds into the social and economic fabric, the second definition of the engineer has become by far the most important.

## Primary Idea of Any Enterprise

Any enterprise is founded upon an idea or rather a combination of ideas which go to make up the policy of that enterprise. The primary idea is that of rendering a service at a profit and necessarily, the contributing ideas of engineering, production, sales and service in the automotive sense must be in a state of balanced coordination to make this result possible. In fact, each of these departments is faced with the requirement of rendering the fullest measure of service at a profit to the whole in order to assure any degree of success to the enterprise.

As the work and success of the production, sales and service department is founded upon the work of the engineer, it is up to him to appreciate the problems of all these departments as related to his own. While the limits of the job of the salesman, superintendent and purchasing agent are pretty well established, the engineer is confronted with the broad problem of designing something that can be made, sold and kept sold. In other words, "carry through an enterprise by skillful and art-

ful contrivance" with a knowledge of basic requirements rather than opinions and fads.

One business man has stated that the automobile industry is no longer one of engineering and production but one of merchandising. The question of body finish which has already been quoted is an illustration of the failure of engineers to keep in touch with an outstanding problem of merchandising. If the last word in performance has been designed into the powerplant, why should this not be rounded out with an equivalent body? In nine cases out of ten it is the style or distinctive appearance that moves the car off of the show room floor.

## Discovering What Owners Want

The sweetest performance in the world goes begging if the customer cannot be attracted into the car. Style is not a problem that is to be solved with a log table or a slide rule, but is an essential requisite of complete motor car engineering. The sales department usually has its ear to the ground and knows what the trend of owner demand is. While the engineer and the sales manager may both be good fellows and swap ideas, the engineer owes it to himself and his company to find out first hand why cars sell in one place and not in another. Why does a car that is popular in Detroit move so slowly in Texas? For one reason they grow them big down there and they need lots of room under the wheel.

Field contact has a lot of value from the sales angle, particularly in making the dealer feel that the fellow who designs his line knows first-hand what his requirements are. This contact brings something to both the dealer and manufacturer that cannot be obtained in any other way. The sales department has its hands rather full of routine details that must be handled and is prone to look upon cars as so many units involving so many dollars while to the engineer, the car should be a living thing whose disposition is understood.

It is the ability to get this idea over that differentiates the engineer from the draftsman who only sees so many centerlines, dimensions and notes on a flat piece of paper. Some, but not many service men get the idea, and one who does is about the biggest sales asset that any dealer can have. It is this ability to get the car over as a personality that warrants extensive trips out into the territory by the engineer and it is the same ability tempered by field contact that makes the interchange of ideas between the engineer and the sales department mutually valuable.

Service is another angle that can be benefited by more contact with the dealer and customer. When there is no beginning or end to the engineer's job but a circle starting with the design which finally gets around to the customer and comes back again in the form of service com-

plaints, the distance between engineers and some service departments is inexplicable. Just because the material progress of the car goes through the engineering, production, sales and service departments in turn and it is found convenient to handle the last two together is no reason for allowing any gap between service and engineering thought and effort. The idea that engineering consists of designing a product that will sell and stay sold is getting under the skins of a lot of manufacturers and several of them already have adopted some means of at least getting service information into the hands of the engineer, but this is only a further means of helping the engineer who really gets in touch with the field.

#### Field Contact Is an Asset

This service thing is a mighty sore subject in many quarters and cannot be overlooked. Perhaps one good way of arriving at an earlier solution would be for more engineers to really drive and take care of their own cars. Field contact is a real asset to both the engineer and his company; and the engineer who voluntarily stays in his office or the management that keeps the engineer with his nose up against the grind stone of office routine is overlooking one of the big factors of commercial success.

Field contact is no more or less essential than contact with two closely related departments at the plant, production and purchasing. From the engineer's viewpoint the fundamental features of the contact with both of these departments are much alike, as in either case it is a proposition of being able to obtain the desired result at the minimum of expense.

One prominent engineering executive whose name is associated with an outstanding development, recently made substantially the following remarks: In the design of this job we first set up the sales and service standards of performance and weight which we wished to obtain. Then we used theory for calculating the possibilities of distribution and weight of various metals and alloys, balancing this with a knowledge of what the effect in the shop would be for each arrangement. Along with this, we carried in mind the relative costs of various materials in the forms desired and the possibility of being able to obtain these materials readily. All in all, the design is the result of about 5 per cent of essential theory and 95 per cent horse sense, which grew out of contact and appreciation of the problems of the purchasing agent and production man.

#### Departments Should Be Closely Related

This statement crystallizes the essentials of the contact between the engineer and the purchasing and production department. Effort like this tends to eliminate the complaint of purchasing department engineering and closes the breach between the engineer and production man.

When things are designed so that the method of production is clear the antipathy between the two departments disappears. When the material or part specified has the earmarks of being the most suitable for the place, the average reasonable purchasing agent has little or no desire to meddle with the specification sheet. Both of these statements are predicated upon the clear understanding that comes from constant interchange of ideas and a viewpoint which keeps in step with other than purely engineering developments.

Engineering is but one phase of the fabric of the automotive industry and plays no greater part in supporting the individual enterprise or the industry as a whole than do all of the other departments. While the work of the other departments is fairly well defined, some

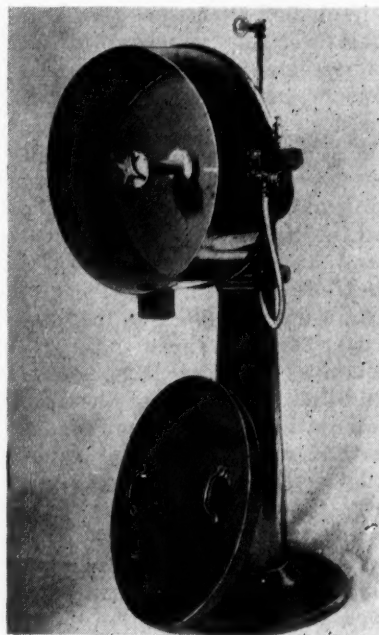
phase of each department is interrelated to the engineering department. Although it is up to the engineer to provide the element of ingenuity and invention, his job never ends and the real automotive engineer is "one who carries through an enterprise by skillful or artful contrivance; an efficient manager."

#### Steam Cleaning Polishing Wheels

**W**ORN abrasives can be removed from rag, felt or leather polishing wheels without affecting their diameter or shape in from one to two minutes, according to claims made for the Reliance polishing wheel cleaning machine, manufactured by M. G. Kopf, 612 Schwind Building, Dayton, Ohio. This machine consists of a substantially built polishing lathe to which is fitted a rustproof, enamel-lined, galvanized iron drum with cover, which is held in place by a gun lock. This drum is large enough to handle a 20 x 4 in. polishing wheel. A steam nozzle, which is adjustable in or out to take care of wheels of different diameters, enters the drum at the

right side. This nozzle is connected to a steam line with a length of flexible hose.

The wheel to be cleaned is placed in the drum and fastened to the spindle. The nozzle is adjusted to within  $\frac{1}{2}$  in. of the face of the wheel and the cover put in place. Power then is applied, and when the wheel has attained 2200 r. p. m., the steam is turned on. The steam is said to loosen the glue and abrasive and the centrifugal force to throw them off. The water from the condensed steam and the glue and abrasive are carried off by a drain at the bottom of the drum which can be connected directly with the sewer.



*Modified polishing lathe with steam nozzle for cleaning polishing wheels*

When leather wheels are cleaned, water is admitted with the steam through a connection above the steam valve. Due to the position of the nozzle and the centrifugal action, water is thrown away from the wheel and does not affect it.

The machine will handle wheels down to 8 in. diameter. It is regularly furnished with a  $1\frac{1}{4}$ -in. spindle, but larger spindles can be had on order, and is supplied with either belt or motor drive.

**A**BILL in Parliament seeking powers for the construction of a high speed automobile road between Coventry and Salford and eventually to be extended to Birmingham, is being strenuously opposed by the railway interests on the grounds that the scheme is financially unsound and unworthy of Government assistance and also that it would take away from the adjoining railway lines the cream of the transportation business, leaving them only the lower grade traffic, such as coal and iron ore. This, it is held, would compel the railroads to either raise the rates on the remaining traffic or reduce wages.



# Action of New Air Brake Dependent on Motion of Vehicle

Road wheels cannot lock. Horn is sounded automatically with brakes in the emergency position. German designer has worked out types for various classes of motor vehicle and also for trailers. Two-stage air compressor with inter-cooler used.

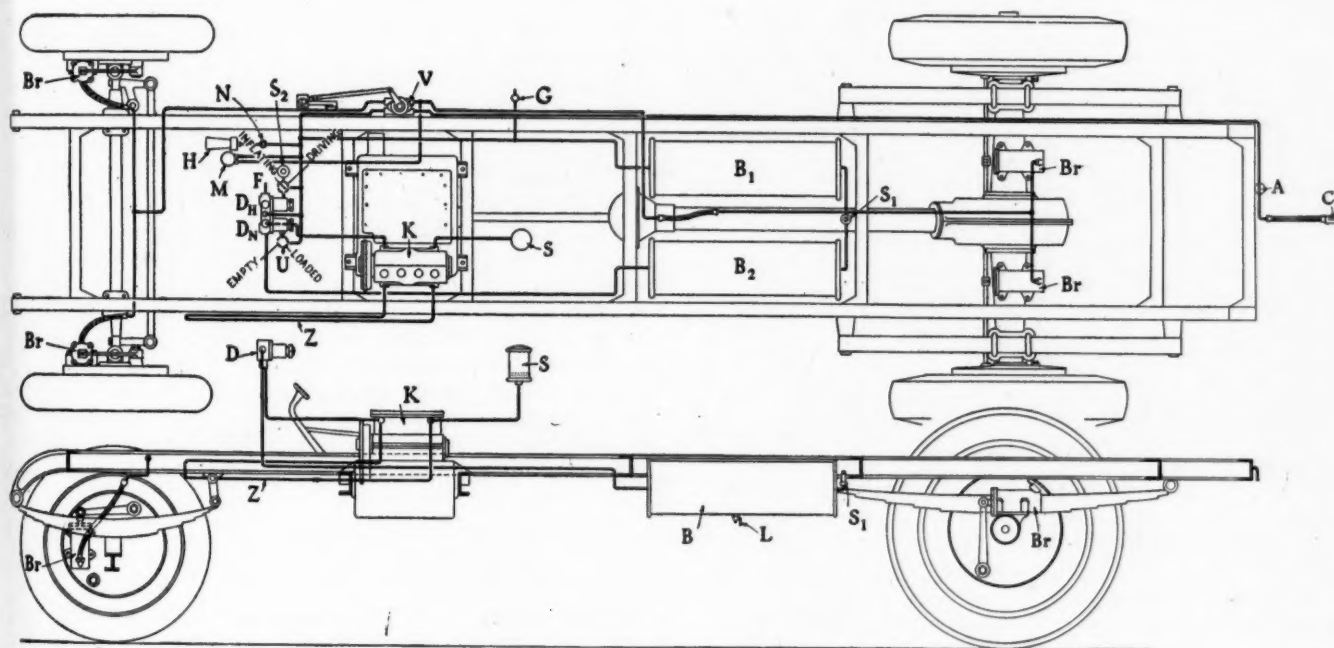


Fig. 1—Schematic drawing of chassis with Knorr air brake on four wheels

WITH the increase in vehicle speeds and of loads there has arisen a demand for power braking. In Germany a good deal of use is made of tractor and trailer trains, and up to the present each trailer has had to carry a separate brakeman, so that on steep hills brakes might be applied to all of the wheels of the train and in case of accidental uncoupling of the trailers these would not run wild. It is obvious that providing a man for each vehicle is rather expensive, and even then the results are said to be anything but satisfactory, as the various brakemen will not apply the brakes simultaneously nor with substantially equal force.

To meet the demand referred to, the Knorr Bremse A. G. of Berlin-Lichtenberg, which has been manufacturing air brakes for the German railroads for the last twenty-five years, has brought out an air brake for motor vehicles. Fig. 1 shows diagrammatically the arrangement of the air braking system on a truck chassis. The two-stage compressor *K* is mounted on the transmission and is driven from the secondary shaft thereof. It has two cylinders, is fitted with poppet valves and operates at 500-800 r.p.m.

All of the air drawn in by the compressor is taken through an air cleaner *S*. An inter-cooler *Z* is carried outside of the frame, where it is exposed to the air current

set up by the motion of the car. From the compressor the air passes through the regulating valve *D* at the driver's seat to the two pressure tanks *B<sub>1</sub>* and *B<sub>2</sub>*. These tanks are arranged inside the frame and are provided with drain cocks to permit of draining off any oil and water that may settle in them.

The object of the regulating valve is to maintain the pressure in the tanks at the values corresponding to the braking powers required for the truck when loaded and unloaded, respectively. This valve has two pressure chambers, *D<sub>n</sub>* for low pressure and *D<sub>h</sub>* for high pressure, and the proper pressures for the two conditions of braking are maintained by the use of diaphragm springs of different pressures. When the two-way valve *U* and the charging valve *F* are set in such positions that both chambers are connected with the pressure pipe, the compressor forces air into the tank as long as the pressure within the latter is below a value considered the limit for braking the empty vehicle. Then the control valve automatically places the compressor into the idling position and the pressure pipe is cut off from the compressor by a return valve combined with the control valve. If the air pressure in the tanks drops even very slightly, the control valve automatically connects the compressor to the pressure pipe again until the normal tank pressure has been restored.

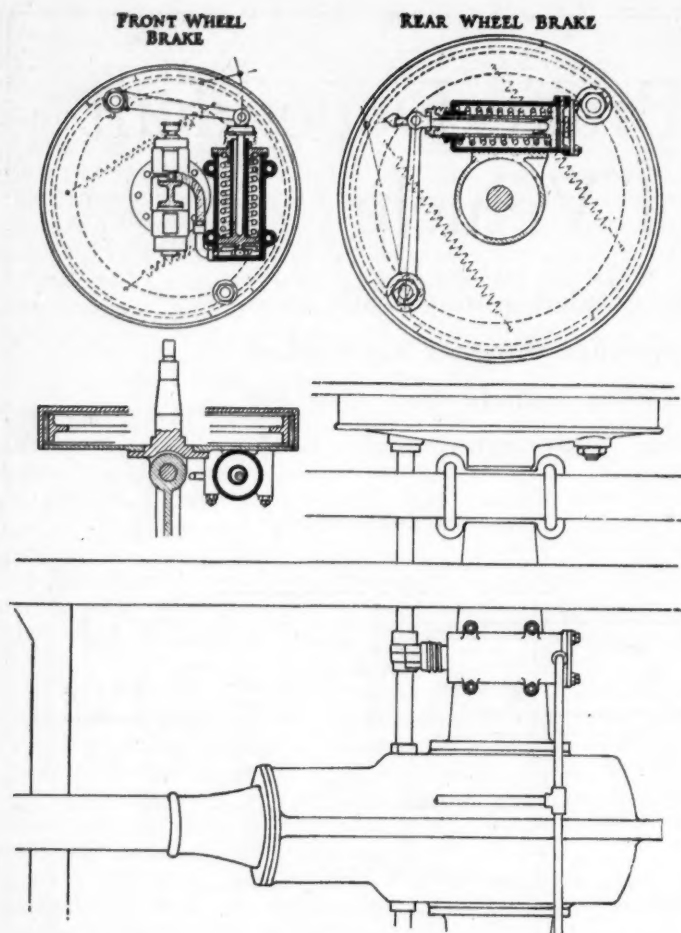


Fig. 2—Application of braking cylinders to front and rear axles

If the truck or train on which the air brake is used is loaded, the air pressure has to be increased correspondingly, and this is accomplished by moving the two-way valve *U* from the "empty" to the "loaded" position. Then the low pressure chamber *D<sub>n</sub>* is filled with air, with the result that its diaphragm is pressed firmly against its jet and the controlling effect of chamber *D<sub>n</sub>* is eliminated.

The compressor then pumps into the tank until sufficient pressure for braking the loaded vehicle is attained. Then the diaphragm of the high pressure chamber *D<sub>h</sub>* begins to act, placing the compressor in the idle running position. If the tank pressure diminishes for any reason, this same control pressure chamber connects the compressor again to the pressure pipe. To the pressure control valve is connected the safety valve *S*, which prevents any undue increase in tank pressure even if the control valve should fail to operate. *V* in Fig. 1 designates the driver's valve, which will be described later on.

#### Inflating Tires from Compressor

The giant pneumatic tires of motor trucks often require inflation pressures of 7 to 9 atmospheres (105-135 lb. p. sq. in.), and in order that the pressure within the tanks may attain to these values the effects of both the high pressure chamber *D<sub>h</sub>* and the safety valve must be neutralized, which is accomplished by turning the charging valve *F* from the "driving" to the "inflating" position. The compressor then forces air through the tire hose connected to valve *G* into the tires until the whistle of the safety valve *S* blows, thereby indicating to the operator that the inflation pressure for which the whistle has been set has been attained.

Mounted on the dashboard of the vehicle is a double

pressure gage which indicates the tank pressure as well as (at times) the braking pressure. When the tires have been duly inflated the "inflating" valve *F* is turned back to its original position and air is blown off at the safety valve until the pressure within the tank drops to that required for braking the loaded vehicle, whereupon the high pressure chamber of the control valve goes into action. While tires are being inflated the transmission is set in the neutral position.

With this system no transmission brake is used, but instead there are brake drums on all four wheels to which the brakes are applied by means of the air cylinders *B<sub>r</sub>*. Connection from the distributing line on the chassis frame to the brake cylinders is made by wire-woven rubber hose which adapts itself readily to all positions of the wheels. At the rear of the chassis there is an air hose coupling *C* with cut-off valve *A* for connection to the trailer braking system. Owing to the use of a common air line to brakes on opposite sides, close equalization of braking action is assured. Compressed air is also made available for operating the horn *H*.

#### Dimensioning Brake Cylinders

In the case of passenger cars the brakes may be designed or calculated for the maximum possible braking power, by assuming a maximum traction coefficient of, say, 0.65, which is obtained on good dry macadam. Then, if the traction coefficient is lower the pressure governor automatically reduces the brake pressure and it is claimed to be impossible to slip the wheels under any conditions. In this way the maximum braking action that is possible with the particular road surface is always obtained.

Calculation shows that under these conditions the rate of retardation in meters per second square is 9.81 times the coefficient of friction. For instance, with a coefficient of friction of 0.7, the deceleration is  $0.7 \times 9.81 = 6.9$  meters (22.5 ft.) per second. The brake cylinders must then be dimensioned accordingly.

In the case of trucks, partly on account of the high center of gravity, it is impracticable to utilize the maximum possible rate of deceleration, and in practice one-half of this value and even less is used. In Fig. 2 are shown sectional views of the front and rear wheel brakes of a shaft-driven truck. Each wheel has its own brake cylinder. At the front wheels the brake cylinders are secured directly to the brake drums, while at the rear the cylinders are carried by the axle housing. There are no brake rods or cables and the use of a common air pipe for the different brakes assures complete equalization.

The brake cylinders on the front wheels are cast of either iron or aluminum alloy and are fastened to the brake drum cover plate by screws. The piston rods are hollow and within them there is a rod which transmits the pressure on the piston to the end of a lever on the brake camshaft. Owing to the fact that there is no positive connection between the brake cylinder pistons and the brakes, the latter may be operated by pedal pressure if desired.

The brake drum covers are riveted to a flange forged onto the steering knuckle. The torsional reaction due to brake application is taken up completely on the steering knuckles and transmitted by them to the front axle and springs, which must be designed to withstand such torque. Connection is made from the air line to the cylinders on the front wheels by flexible armored hose. At the rear the brake cylinders are mounted on the axle housing and act directly on a cross shaft as shown. With chain driven trucks the arrangement of the front brakes is the same, while the rear brake cylinders are mounted on the stationary axle.



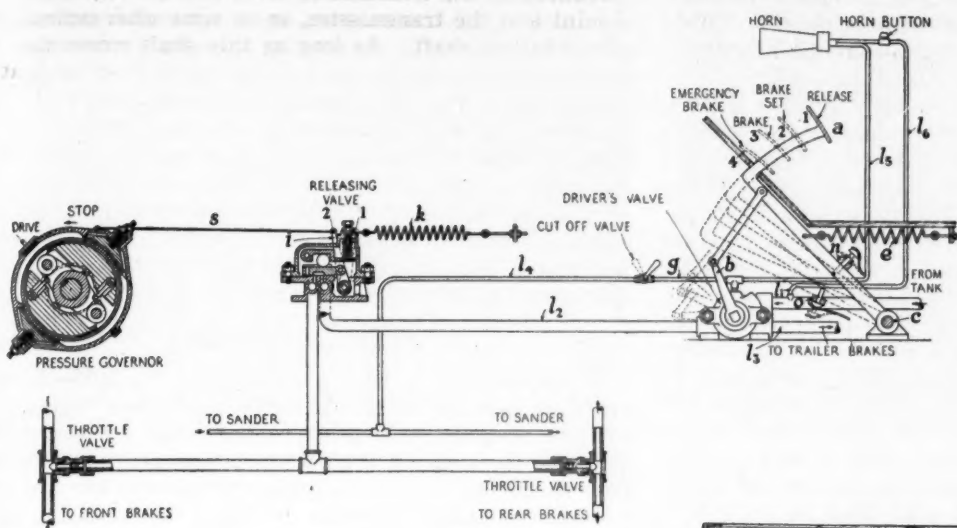


Fig. 3—Brake operation for motor vehicles with driver's valve and release valve

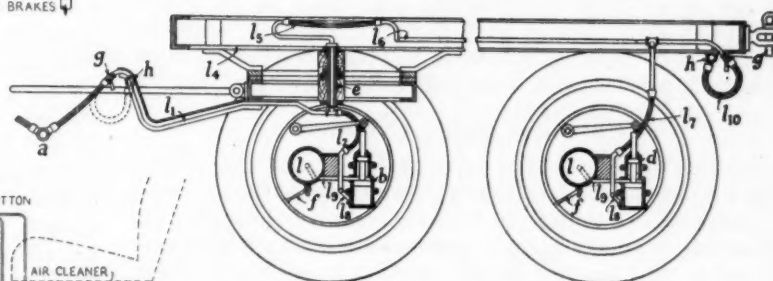


Fig. 4—Differential piston brake for trailers

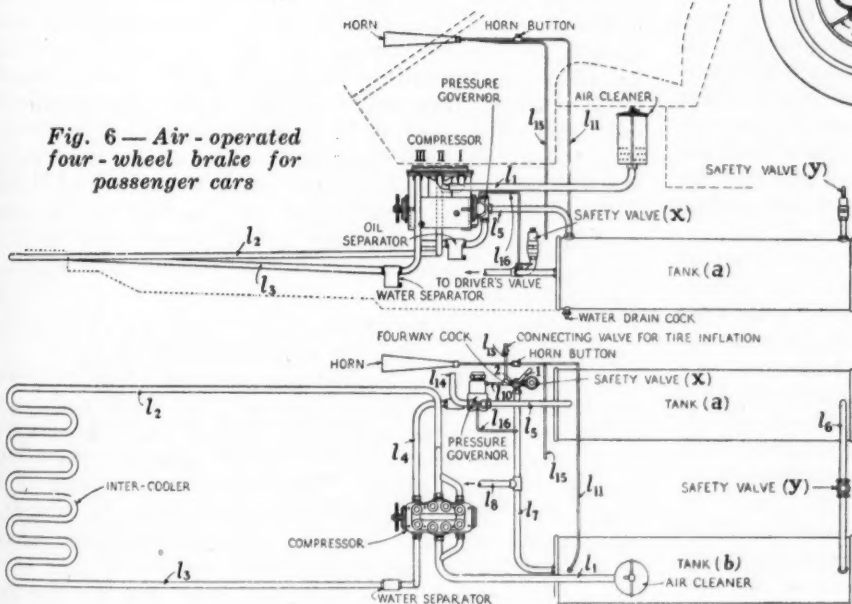


Fig. 6—Air-operated four-wheel brake for passenger cars

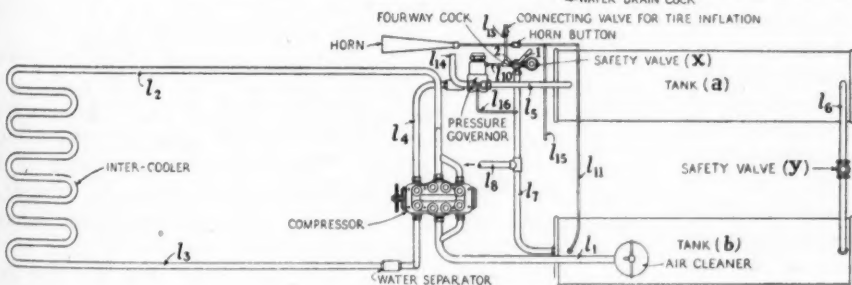
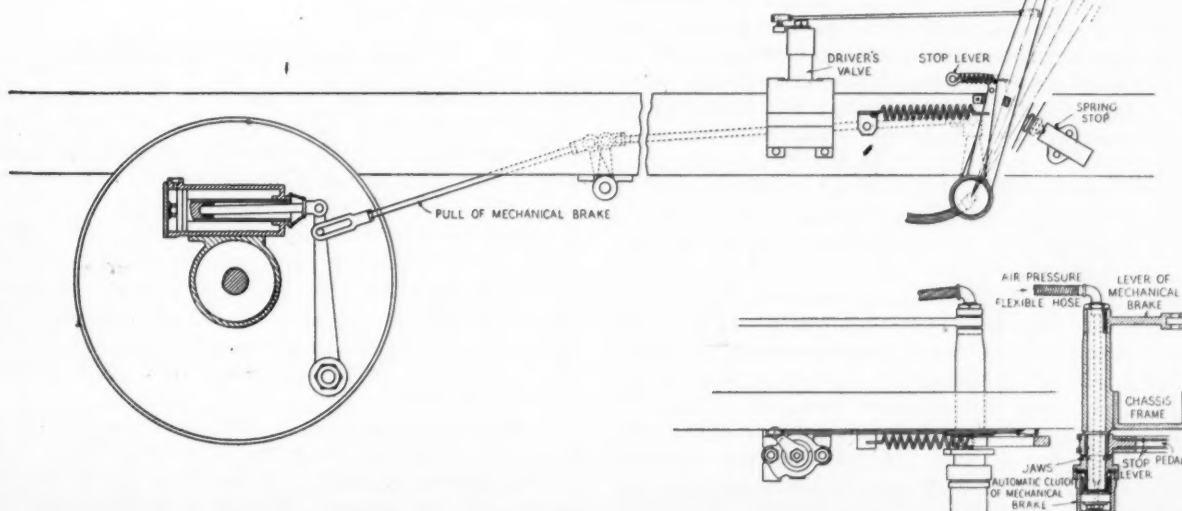


Fig. 5—Air brake combined with hand emergency brake



In order that the brakes may be released quickly it is essential that the cylinder volume which must be filled with air at each application be as small as possible. This can be assured by close adjustment, so that the idle movement of the piston is reduced to a minimum.

In Fig. 3 are shown the control valves and other details. The brake is applied by the pedal *a* which connects by a link to the lever *b* of the driver's valve. The pedal is mounted loose on its shaft *c* and is normally held in the released position by a spring *e*. The driver's valve is supplied with air from the tank through the tube *l*<sub>1</sub>; from this valve, pipe *l*<sub>2</sub> leads to the brake cylinders of the truck and pipe *l*<sub>3</sub> with cut-off valve to the brake cylinders on the trailer. A third pipe *l*<sub>4</sub> leads to the sanding device on the rear wheels and is provided with a cut-off valve for stopping the flow of sand. From pipe *l*<sub>1</sub> pipe *l*<sub>5</sub> leads directly to the horn, while pipe *l*<sub>6</sub> leads to the horn through the button valve. Hose *l*<sub>7</sub> and connecting pipe *l*<sub>8</sub> lead to the brake cylinders of the rear wheels. Hose *l*<sub>9</sub> and *l*<sub>10</sub> serve as a flexible connection between the pipe line on the frame and the axle. Pipe *l*<sub>11</sub> is rigidly connected to the pin *e* and consequently rotates with the fifth wheel or with the front wheels. Hose *l*<sub>12</sub>, which is located above the center of rotation, allows for a wide range of steering motion.

#### Differential Brake Cylinders

Referring to Fig. 4, the brake cylinders of the trailer brake are of the differential or two-diameter type, with two pistons. Air enters the lower cylinder through pipe *l*<sub>1</sub>. The lower piston has a leather cup packing which permits air to pass by it into the upper cylinder from which it flows through pipe *l*<sub>2</sub> to the auxiliary tank *l*. As the lower piston has a smaller area than the upper one, the balance of pressure is in the upward direction and the pistons will be held in the topmost position, as shown, which is that of release.

When the pressure in the brake pipe is diminished by the driver's valve, that in the lower cylinder is also diminished, and the higher pressure in the auxiliary tank *l* then forces the pistons downward, applying the brake. If the pressure in the automatic pipe is now increased, the pistons are forced upward and the brake is released. If it is desired to stop the car as quickly as possible, the automatic pipe is opened to the atmosphere by means of the driver's valve, and the air pressure in the auxiliary tank then acts on the piston to greatest advantage.

If the coupling between the truck and the trailer should come apart for any reason, the hose coupling *a* also would be broken or separated. In the foreward one of the connected pieces of hose on the truck or foreward trailer, there is a check valve which closes automatically as soon as the coupling is severed, so that no air can escape. On the other hand, air will escape from the other one of the connected pieces of hose, on the trailer, and the air pressure in the auxiliary tank on that trailer will immediately apply the brakes, thus preventing it from running wild.

To release the brakes on the disconnected trailer it is only necessary to open the drain cocks on the auxiliary tanks. The automatic pipe may be closed by valves *g* and when the trailer hose is not in use it may be attached to the dummy coupling *h*.

The brakes on the truck are applied directly by the air pressure, whereas the brakes of the trailer or trailers, which are in the form of two-chamber brakes, are "on" when the air is allowed to escape from the air lead to the trailer by means of the driver's valve and vice versa. In case the trailers are uncoupled, accidentally or otherwise, the hose couplings are released, the air escapes from the line and the trailer brakes go on immediately. At the same time the air line of the truck closes automatically, so that no loss of air can occur.

A brake pressure governor, shown in sections in Fig. 3, is mounted on the transmission shaft between the universal joint and the transmission, or on some other continuously rotating shaft. As long as this shaft rotates the pressure governor produces a uniform pull in the direction of rotation. This pressure is transmitted by the cable *s* to lever *i* of the release valve, which is thereby turned from position 1 to position 2 against the tension of spring *k*, in which latter position it uncovers the valve ports connecting to the brake cylinders. When the shaft stops the pull on the cable ceases and the lever *i* then returns to position 1. The supply of air is then cut off and the brake cylinders are opened to the atmosphere.

#### Brake Control

When the foot is off the brake pedal the latter is in the released position, 1, and all brakes are then released. If a light pressure is applied to the pedal by the driver's foot and the pedal is thereby moved to position 3, a small port in the driver's valve opens, permitting the air under pressure to enter the brake cylinders, the pressure of application building up gradually. For continuous braking the pedal is released until the effect of the spring stop *n* becomes noticeable to the foot, in position 2 of the pedal. All ports of the driver's valve are then closed, so the air cannot escape from the brake cylinders.

If more powerful braking is desired, the pedal is pressed down all the way, to position 4, by overcoming the resistance of the spring stop *o*. All ports of the driver's valve are then fully opened, so the air flows into brake cylinders without being throttled. At the same time the driver's valve opens the line *l*<sub>4</sub> to the sand boxes, whereby a blast of sand is directed onto the rails in front of the rear wheels, the force of the blast being adjustable by means of throttle valves. As already mentioned, the air flow to the sander may be shut off by the valve *g*. A branch pipe from the sander air line leads to the signal horn, so that whenever the brakes are set for a quick stop the horn is sounded automatically. If the pedal is allowed to return to position 3 or 2, both the sanding and the sounding of the horn stop automatically, although the braking effect continues.

The driver's valve is so designed that the brakes on the trailer go into effect a moment earlier than those on the truck, and the release of the brakes naturally takes place in the reverse sequence. Throttle valves located in the lines to the forward and rear brake cylinders, which act in one direction only, have the effect of applying the rear brakes somewhat earlier than the front ones and of releasing them later, with the result that slipping and skidding of the truck and trailer upon the application of the brakes are obviated.

#### Governor Prevents Skidding

As the brakes are designed to almost lock the wheels under conditions of maximum road adherence, on slippery road surfaces, if the brakes were applied fully, the wheels would slip, and skidding would result. To prevent this is the object of the air pressure governor, (Fig. 3) the angular motion of which is transmitted through *s* to the lever *i* of the release valve, which latter is normally held in the released position by the spring *k*. In this position the air supply to the valve is cut off and all of the brake cylinders are opened to the atmosphere, hence there would be no braking effect even if the brake pedal were moved to position 3 or 4.

However, if the vehicle begins to move, the pressure governor, rotating with the propeller shaft, produces a slight turning moment, just sufficient to turn the releasing lever *i* to the driving position 2 against the tension of spring *k*. When in this position the driver's valve is sup-



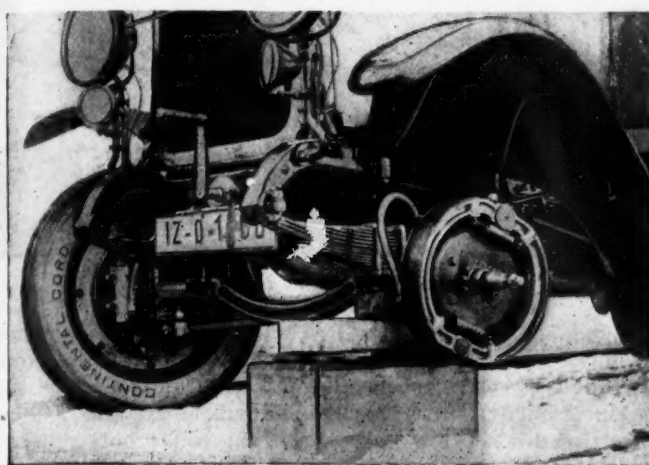


Fig. 7—Showing Knorr air brake applied to front wheels of truck

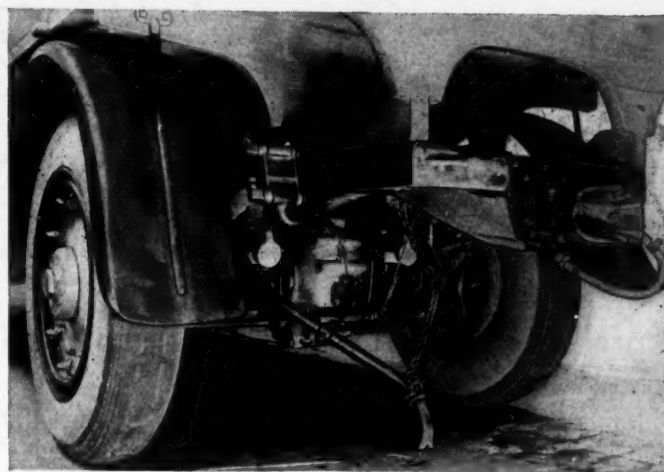


Fig. 8—Showing brakes on truck rear axle. (Note brake cylinder on top of axle housing and air hose extension for trailer)

plied with air and the brakes are applied in the usual manner. If the rear brakes should be locked the propeller shaft would stop rotating, but before this can occur the drag of the pressure governor decreases to such an extent that lever *i* is returned by spring *k* to position 1, the release position. This diminishes the braking effect and prevents locking and consequent skidding.

The brake pressure governor is of such design that the turning moment produced is constant, independent of the speed of the shaft, and can be kept very small. In order to relieve the cable still more, a stop pin is provided in the governor case on which the turning moment is taken up after the angular movement of the governor is completed. In this way the cable is relieved of any tension beyond that required for overcoming the spring. The drag of the governor, which is required for placing the spring under tension and setting the valve, may be adjusted by two set screws on the governor case.

As already mentioned, the governor permits of a braking effect only while the wheels are moving, and just before the wheels come to a standstill the brakes are released automatically, the resistance to the motion of the car being sufficient to bring it to a standstill.

If the vehicle is to be brought to a stop on a hill, then the emergency brake must be applied after the car has been brought almost to a stop by the air brake, or the lever *i* may be moved by the driver temporarily to position 2, in which case the vehicle can be brought to a standstill by the air brake.

#### Combination Hand and Air Brake

In Fig. 5 is shown the combination of a mechanical brake with the air brake. The brake pedal acts in the same way as in the assembly shown in Fig. 3, its motion being transmitted to the driver's valve by means of a rod with ball joints. A hand lever for the mechanical brake is keyed to the pedal shaft and the way in which the brake pressure is transmitted to the brakes is directly apparent from the drawing.

Since the pressure rods are loosely mounted in the piston rods of the air cylinders and there are long slots in the pull rods independent operation of the brakes by hand and by the air cylinders is possible. The pedal shaft is made hollow and connects through a flexible tube with the pressure lead *c*. The air pressure continuously acts on a piston in an air cylinder, guided by keyways in the pedal shaft, thus forming the stationary clutch housing of the automatic clutch. The jaws of this clutch engage with similar jaws on the hub of the brake pedal which is loose

on its shaft. A strong coiled spring within the cylinder holds this clutch in the engaged position when there is no pressure in the air lead. The brake pedal is then locked to the pedal shaft and actuates the mechanical emergency brake directly.

However, when the air pressure in the tanks is sufficiently high, the clutch is disengaged by this pressure and the pedal is free on its shaft, so that if it is depressed it actuates only the driver's valve. The mechanical brake is then disconnected. If the air pressure in the tanks decreases to such an extent that it is no longer sufficient to operate the brakes effectively, the clutch is automatically engaged again by the spring pressure. Hence depression of the brake pedal will always produce a braking effect whatever the air pressure may be.

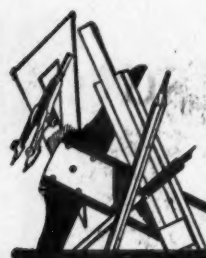
#### Four-Wheel Air Brake

A design of four-wheel brake for heavy passenger cars has been worked out by Knorr and is illustrated in Fig. 6. The two-stage compressor is located either at the side of the engine or on top of the transmission, and is driven in the usual manner by either gears or a chain. It draws air through an air cleaner and through the pipe *l*<sub>1</sub> into the low pressure cylinder, whence it passes through the inter-cooler and pipes *l*<sub>2</sub> and *l*<sub>3</sub> to the high pressure cylinder. From the latter the air is forced through the pipe *l*<sub>4</sub> to the air tank *a* which communicates through pipe *l*<sub>5</sub> with tank *b*. A safety valve *y* is mounted on pipe *l*<sub>5</sub>, and the whistling noise of this safety valve indicates when the pressure in the air tank has reached the predetermined limit.

From tank *b* the pipe *l*<sub>6</sub> leads to the driver's valve. A pressure governor is provided to maintain an even pressure in the tanks and is connected by pipe *l*<sub>7</sub> to the pressure pipe *l*<sub>6</sub>. When the predetermined pressure has been reached, the compressor is automatically shifted to the idling position and the valve in the pressure pipe is closed at the same time. If the tank pressure decreases below the predetermined value the compressor is started again.

For tire inflation the following provisions have been made: The pressure pipe *l*<sub>6</sub> extends from tank *a* to a four-way valve which connects with the safety valve *x* for brake pressure and by pipe *l*<sub>8</sub> with the pressure governor.

If tires are to be inflated, the four-way valve is turned to position 2, whereby the safety valve *x* is shut off from the pressure pipe and the spring chamber of the pressure governor is put under pressure, rendering the governor ineffective. Air is pumped into the tank until the safety valve for tire pressure begins to blow off, indicating that the proper pressure for tire inflation has been attained.



# The FORUM



## Purchaser's Credit Is of First Importance

Editor, AUTOMOTIVE INDUSTRIES:

In a recent issue of your magazine there appeared an article by Mr. James Dalton, which, while excellent in some respects, nevertheless inferred that it is an unsound practice for finance companies to lend money to automobile buyers without a repurchase agreement or an endorsement on the part of the automobile dealer. As Mr. Dalton emphasizes the fact that the credit of the purchaser is the most important factor in the proper financing of time sales, it seems to us that the inference and statement are conflicting.

We agree 100 per cent with Mr. Dalton that only those who can afford to own and operate an automobile should be provided credit with which to purchase it, but we entirely disagree with Mr. Dalton's inference that the non-recourse company is careless on credits. In fact, the truth is just the opposite because in the event that the purchaser cannot pay, the non-recourse company absorbs the entire loss, whereas under the other methods, part or all the loss is borne by the dealer, and therefore self-preservation alone makes it necessary for the non-recourse company to be particularly strict on credits.

EMLÉN S. HARE, Vice-President,  
Hare & Chase, Inc.

## Better Roads Will Build Business Abroad

Editor, AUTOMOTIVE INDUSTRIES:

Sir—I was very interested in your lead article in the issue of May 22 describing the World Motor Transport Congress. I congratulate you upon the presentation which you have made.

Personally, I feel that the more the motor car manufacturers' attention is directed to foreign markets the sooner they will appreciate the desirability of cultivating that business. Our American manufacturers, as a rule, are slow to take up foreign trade, but with the very splendid start which has been made I believe that there will be a considerable growth, especially as soon as better roads are provided abroad—and there seems to be a general movement for better roads in many countries.

PERCY OWEN,  
Chief, Automotive Division.

## Air Consumption Measures Horse Power

Editor, AUTOMOTIVE INDUSTRIES:

Your issue of May 22 contains a summary of my paper on the above subject. As your account does not include any figures or graphs showing the range over which the experiments were made, the statements of your opening paragraph require some qualification.

The air consumption was found to be proportional to

the indicated horsepower. When this has been deduced by measuring the air consumption, the brake horsepower is found by subtracting the frictional losses. As aero engines have a high mechanical efficiency and are not throttled down below half power, the brake horsepower is nearly proportional to air consumption. Engines of lower mechanical efficiency and engines which are throttled down in use to a small fraction of their full power would show considerable deviation from proportionality between brake horsepower and air consumption, even if they retained the law of proportionality between indicated horsepower and air consumption.

H. MOSS,  
Air Ministry Laboratory, Imperial College of Science,  
London.

## Buenos Aires Uses Many Ford Buses

Editor, AUTOMOTIVE INDUSTRIES:

The writer has noticed an article in the AUTOMOTIVE INDUSTRIES, under date of Dec. 13, which is somewhat misleading, as it states that the omnibus is coming into its own in Buenos Aires, and that the small buses made up of a 12-passenger body built on Ford truck chassis are fast disappearing and are being replaced by solidly constructed bodies with seating capacity for 20 passengers, mounted on heavier truck chassis.

We might add that in the city of Buenos Aires there are 126 Ford truck chassis with omnibus bodies which pertain to 22 different companies as against 31 truck chassis of other makes.

You possibly got this opinion due to the fact that the Ford Motor Co. and dealers pioneered the omnibus business in Buenos Aires. This business was first started by our dealers, and it is quite natural that once this business was started and on a sound footing other companies seeing the possibilities it was quite natural that other makes of buses were bound to enter this business.

We are giving you this information not because we feel that this article has harmed us, for it has not, but merely to put before you the facts as they exist and which facts were not taken from hearsay by someone not thoroughly acquainted with the situation here.

F. F. GRIFFITH,  
Manager, Ford Motor Co.,  
Buenos Aires, Argentina.

A FLOOR covering made principally of cork and designed to prevent the transmission of vibrations from machinery to the building has been placed on the American market by the Korfund Co. of New York. It consists of cork blocks 19/16 in. in thickness which are rigidly held in wrought iron frames and made up in sections of any desired dimensions. The blocks are not granular, but made from the original solid cork, and are claimed to be free from disintegration. Either the section of the floor under individual machines or groups of machines or the whole floor may be covered.



# Production Alone Does Not Measure Prosperity Accurately

*Uneven distribution of gains and losses shown this year.  
Increases are made chiefly by low priced cars.*

By Norman G. Shidle

**I**STRUMENTATION" is a technical sounding word that has been used by the engineers for a long while to describe the process of developing instruments of various kinds for the purpose of measuring or gaging various characteristics of car design or performance. The general executives and sales managers haven't been much concerned with any such high-sounding phraseology but a good many of them are coming around to the belief that some sort of new yardstick is needed to measure the relative efficiency of sales work and of company prosperity.

Not so long ago everybody used to look at the production figures for the industry and then say, "Well, things look pretty good this quarter; we went ahead of last year by 50,000." Many times it was discovered, however, that despite the favorable appearance of the production reports, profits weren't going up the way they should and dealers didn't seem to be so happy as they might be. The situation existing at the present time furnishes a good example of this general thought.

The industry built more vehicles by about 165,000 the first quarter of this year than during the same period in 1923. But few companies considered themselves in any very favorable economic period during that time. The reason is quite obvious, of course. Many factors other than production enter into the promotion or hindrance of prosperity.

## Individual Company Progress

While the production totals for this first quarter were published several months ago, only recently have detailed figures become available so that it is possible to break up the totals into separate parts and thus get a more nearly accurate picture of current trends. Even study of individual company outputs fails to tell the whole merchandising story, but it does constitute an important chapter in it. The figures give necessary information with which the manufacturer can correlate figures of dealer stocks, retail sales and other factors and thus direct more intelligently his future merchandising activity.

Detailed production figures for the first quarter show quite an uneven distribution of gains and losses. Much was made of the fact early in the year that first quarter production in 1924 exceeded that of 1923 by some 165,000 vehicles. Figures for individual companies, however, show that the gain was due to about twenty companies out of the seventy or eighty active producers in the field and that out of those twenty only about seven or eight made material increases over the first quarter of last year. The success of three or four out of this eight can be attributed almost directly to the introduction of distinctly new models, accompanied by an energetic merchandising campaign in their behalf.

Several new makes which got into production this year for the first time already have won for themselves a substantial place in the market.

A large proportion of the list of companies which built more cars in the first quarter of 1924 than in the same period of 1923 consists of factories turning out cars which sell for less than \$1,000.

Several middle-priced cars made material advances, but the names of cars selling for over \$2,000 are noticeably scarce in the list of those making an increase over last year.

## Production as Related to Prosperity

General Motors output for the first quarter, including GMC trucks totaled about 210,000 and exceeded that of 1923 by about 45,000. The gain was not uniform throughout the units, however, as some failed to come up to last year's mark while others topped it by a considerable margin.

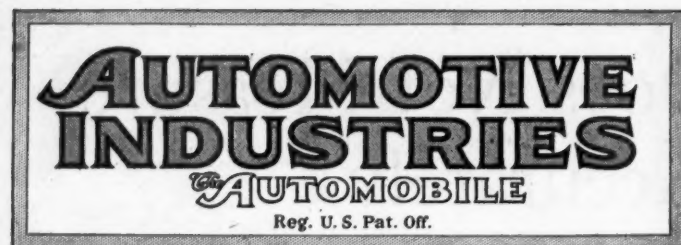
While it is true that Ford accounted for about 100,000 of the total increase in production during the first quarter this year, other cars made substantial gains as well so that there was an increase over last year's figure for cars exclusive of Ford.

Some of the companies which had the highest production figures in the first quarter of this year and in the last quarter of 1923 probably will show unusually low output records for the second and perhaps the third quarters, than were retailers in some other lines. Several manufacturers who show gains, on the other hand, have been because their dealers were stocked with cars more heavily moving their cars regularly through the dealers and into the hands of owners; their increased production has coincided with increased sales.

## Decreases Shown in Many Cases

Many of the manufacturers whose production totals fell below those of the first quarter in 1923 are in a better position at the present time from a merchandising standpoint than are some of those who pushed manufacturing schedules ahead of 1923. In only a few instances, however, has the falling off been of serious proportions. In one or two cases where such a drop has occurred it is expected that the particular make will be taken off the market in the none too distant future and will be supplanted by a new line, built by the same manufacturer.

All of which means two things: First, that study of production data for individual companies often throws a very different light on the actual situation in the industry than does an inspection of totals for the business as a whole. Second, that production figures alone are far from accurate guides as to the economic position of a company at any given time.



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# Our Industry Today—

## *Indications Point to Greater Activities Among Producers Because of Introduction of New Models and End of Vacation Period*

NEW YORK, July 14—Vacations, inventory-taking and the introduction of new models have seriously interfered with automobile production for the past month, but with the beginning of the last half of July it is apparent that the manufacturers are busying themselves in preparation for fall business and setting things to rights for 1925.

This really is the start of the industry's fiscal year, and the slowness of June may be properly attributed to a general housecleaning in the way of cleaning up old stocks and balancing 1924's ledgers. That done, car builders now are in position to start afresh, confident that ahead of them lies good business because of crop prospects and a more cheerful tone in the business world, brought about largely by the closing of entries in the presidential race. With the political atmosphere clear and the farmers confident of garnering big crops, the automobile industry should be in position to go ahead with confidence in the immediate future.

There is a more optimistic tone to the reports coming from the producing end of the industry. Several plants which have been closed down for vacations and inventories resumed operations last week, and it may be said without question that already there has been a slight upward movement from a production point of view. General indications are that this will improve as the month progresses, so that July should show fairly substantial figures when the count is taken.

Manufacturers introducing new models recently are rounding into production now, and though it is not expected that capacity conditions will be reached, nevertheless enough business is lining up to insure heavy operations for some time to come.

### **Good Business in Sight**

While the production departments have been busy of late on 1925 plans, the sales managers have not forgotten that dealers throughout the country still have considerable stocks in the warehouses and every effort is being made to deplete these so the retailers will be able to wipe the 1924 slate clean before the new jobs come through.

Factories are cooperating with their dealers and are not pushing them, as is evidenced by the June report of one of the biggest producers, which shows that its retail sales last month were more than twice the production. The action was sufficient to reduce stocks of the dealers representing this company to normal and illustrates the sane and conservative policy of the industry in meeting such conditions as has confronted both manufacturers and retailers for the last several months.

It also explains the somewhat slow condition in the light car field in which outputs have been materially curtailed for several weeks through the desire of the factory managements to not forge ahead of the pacemaking retailers.

## **New Models Keep Clevelanders Busy**

### **Full Day Shifts Operating and Some Also Are Using Night Crews**

CLEVELAND, July 14—Attention of automobile manufacturers, and parts makers associated with them, has been centered on models to be sold under the 1925 banner, during the last week. The companies locally which already have put their next year's cars on the market report that they are operating on full day shifts and in some instances are using night crews.

The manufacturers of these advance cars assert that the demand is not the result of allotments to distributors for future sales, but it is based upon actual demand of the buying public for the new designs. The most optimistic reports are coming from such firms as Cleveland, Chandler and Jordan, where it is said that the best business of the year will be shown for July.

In the case of the Cleveland company a full force of men is being used in production on the day shifts and an equal number of men for the night turn, in many departments. The employment situation for all builders here has had a constant turn for the better, the companies reporting that they are gradually getting their forces back to normal, even where the 1925 models are not yet in production.

The entrance of the coming year's cars has also had a favorable reaction on such lines as body and parts builders. This is especially true in the case of the Fisher Body Corporation, which is producing a good share of the bodies for the new models.

A canvass of automobile makers in this territory shows that the majority of them

believe that 1925 will see a marked change in the field. With both the motor-ing public and the manufacturers themselves demanding longer life for the automobiles, it is thought that the coming year will see the builders turning their attention to creating increased uses for cars, rather than to resales as a means of providing an outlet for large production.

The builders here assert that the 1925 cars will be so constructed and will have undergone such tests before being placed on the market as to insure longer life. This in turn, they say, means that cars will have to be sold in a larger degree to those people who have not previously owned them or that more cars will have to be sold to present owners.

### **Seek Long-Lived Cars**

It is the theory of some builders here that eventually longevity will stimulate rather than hamper increased sales. It is pointed out that the longer life a car has the larger portion of the people there will be who can feel justified in making an investment in them.

Another argument which is frequently presented is that as the cars become more durable the man owning but one car will find that he can afford to purchase another to aid either his family in getting about or to help in handling his own business affairs.

As the mid-year inventories are getting cleared away the car builders here are turning their attention to production, which they say will be on an entirely satisfactory scale for the balance of the current year.

The firms report that the mid-year check-up of profit and loss is in an entirely satisfactory shape. The builders assert that the financial statements at the end of the year will show a fair margin of profit for 1924.

## **Chicago Expects Pickup in Business**

### **Automotive Break Looked for In 30 Days Following Present Seasonal Lull**

CHICAGO, July 14—Automotive production of this section is experiencing a lull which right now is both seasonal and a result of backward conditions affecting industry generally in all parts of the country.

Because of the fact that a slowing down of most operations at this time of year is a normal situation there are few producers who look for any material upgrade change until the seasonal sag has run its course, although it is expected that the next 30 days will show many



# Plants to Speed Up This Month

signs of improvement. Just how long it will be before the automotive industry will return to robust proportions is something which manufacturers in this zone are reluctant to predict. Recent surveys of the field indicate that the downward tendency has not been stopped, notwithstanding the general opinion some days back that the bottom had been hit and industry was gathering force for the uphill climb again.

An idea of what took place in June in the State of Illinois is gleaned from the State Department of Labor's June report on employment. There were some heavy curtailments in working forces in June, the automotive industry joining manufacturers generally in trimming down their forces. In Moline, the hardest hit city of the State, it is reported that factories laid off 25 per cent of their workers in June, in addition to the 13 per cent laid off in May. This curtailment, however, did not include the Velie Motors Corp., which while not enjoying the business anticipated early in the year, is going ahead with its "reasonably conservative" program and expects to finish the present year well up with its plans, or ahead. Velie is one of the exceptions to the rule, and hence its pleasing condition does not reflect the general tone of prosperity.

Other automotive factories in that part of the State do not make such encouraging reports, although on the whole they seem to be, along with those of Illinois generally, in better shape all around than many other lines of production.

## Unemployment Prevails

According to estimates the close of last month found Illinois with 172 workers for each 100 jobs, as against 100 for each 100 jobs at the same time in 1923. Unemployment, therefore, is at a higher point now than at any time since the recovery from the depression of 1921, when Illinois at the close of June counted 240 workers for every 100 jobs. The June employment decline in Chicago was 2.3 per cent, which was less than the average drop of 3.4 per cent. The decline of April, May and June is put at 7 per cent.

Truck manufacturers continue to hold their own, although in some quarters there are complaints that business of the past month or two has been considerably below expectations and not comparable with earlier months. Little change is expected in this line until after the vacation period, when seasonal activities resume. Farmers are not in the truck market but their purchases compose only a fractional part of the volume done by producers around here, and constantly developing new outlets easily make up for this shortage.

The truck industry is rightfully optimistic, for it is expected that this year will prove fairly satisfactory and that inevitable replacements next year along with the usual demands will likely write 1925 down as a record breaker.

## Parts Makers Feel Detroit Activities

### Extension of Operations Gradually Speeding Up Factories in Michigan Territory

DETROIT, July 13.—Industrial conditions in this territory are showing a much better trend, increasing activities in car companies now extending out to the parts and material makers which are gradually getting into more extensive operation than for some months past.

## The Week in the Industry

**AUTOMOTIVE INDUSTRIES** survey shows 15,523,898 passenger cars and trucks were registered in the United States on July 1, 1924, a gain of 19 per cent over the registrations on the same date last year. While the increase over Dec. 31, 1923, is small, 301,240, it must be remembered that July figures are comparable only with the July registrations of the year before. Failure of registrations in a given State to reach the total of the end of the previous year is of little significance in most cases, since the last six months are almost certain to show a gain.

General Motors has put into practice its new policy of reporting each month deliveries to consumers in addition to giving the number of cars and trucks bought by the dealers themselves. This, it would seem, is destined to be a monthly guide for the industry, carrying with it, as it does, authentic information as to what the powerful General Motors units are actually doing in the way of moving cars.

Official announcement has been made by the Automotive Division of the Department of Commerce that the British import duties will be removed Aug. 1. When the ban is actually lifted it may be expected that the renewed activities of the importers of American cars will be redoubled, it being anticipated that their business in Great Britain will increase anywhere from one-third to three-fourths.

June production of cars and trucks shows a reduction of 20 per cent under May and 34 per cent under June of last year, but this report is not at all alarming, again demonstrating that car builders have tempered production to demand and are not overloading their dealers who are rapidly depleting their stocks to be ready for the 1925 output.

July will not be a high production month as compared with some months, but general inventories are now close to the vanishing point, making certain gradually increased operations from this time on.

The Ford Motor Co. is continuing on a low production basis for the present, many departments of the plant not working Friday or Saturday, this being due to two causes, first of all the gradual clearing away of all dealer stocks, and secondly the gradual transfer of some operations from the Highland Park plant to new River Rouge buildings. Ford increased business was well over the 100,000 mark in the first six months of the year, but as this was lower than anticipated there are still some dealer stocks to be cleared.

The Motor Wheel Co. resumed operations this week after a three-week vacation closing, and is rapidly adjusting itself to a normal basis of activity. Several other Lansing plants have increased operations, the Durant Star producing plants most notably, requiring increased operations at its material and body supply sources. Releases to parts makers reflect the gradual improvement in car manufacturing. As parts makers are enabled to resume on a fair basis of operation the industry in this district will be in very good shape, with little or no actual unemployment.

## New Models in Production

New models now in production in several plants will have the effect of increasing the monthly total only in that these plants have resumed following temporary closings to get ready for the new offerings. Plants which were operating strongly previous to new model introduction by competitors have not shown any sign of being affected and are continuing on a good basis of operation. If anything, new models have simply had a generally stimulating effect as has been the case in other years.

Part of the slowness in buying in recent weeks has been ascribed to buyers delaying until they had seen the new offerings. Now that these have been displayed the tendency is to make purchases, not necessarily in the lines showing the new stuff, but with these as a basis of comparison. If any one particular point has been demonstrated by new model showings, it is the popularity of balloon tire equipment. The desire for these alone will make for good fall business, car manufacturers declare.

The clarifying of the political situation by the selection of nominees will have an immediate stimulative effect on business, and gradual resumption of industrial activity through the country will restore automotive buying, manufacturers believe. Good business in the city districts alone will keep automotive manufacture high, but with this, manufacturers believe, will develop a good volume of farm buying.

## General Motors Units Report Retail Sales

### For First Time Corporation Gives Facts About Movements of Products of Its Subsidiaries

NEW YORK, July 14—As promised, the General Motors Corp. has inaugurated its new policy of issuing monthly reports not only of sales to dealers by its various units but also retail sales made by the dealers themselves. This is an innovation in the industry which from now on will be in the nature of a barometer showing accurate trade conditions month by month.

General Motors has for some time been reporting on dealer sales, but June is the first month in which retail deliveries have been included. The combination report shows that General Motors for the last three months has been following a policy of not overproducing, keeping production well in hand so that the dealers might have a chance to move their stocks without being asked to take more than they could safely handle.

#### June Deliveries Pushed

Units of General Motors, as shown by the report, pushed production hard for the first three months, thus accumulating a surplus which enabled their dealers to stock for the spring demand. When the anticipated business did not develop because of weather conditions, production was materially cut. Figures for June show that retail sales were twice dealer deliveries, 33,983 being absorbed by dealers, while 66,146 cars were bought by consumers.

For the first six months of the year, General Motors units sold 354,098 cars to consumers and 379,950 to dealers, which would indicate that on July 1 dealers had only 25,492 cars in stock. Figures for 1923, for the same period, showed 397,181 retail deliveries as against 408,985 dealer sales. In this connection it should be recognized that 1923 was the largest year the industry yet has experienced.

The report for the first six months of 1924 and for corresponding periods in 1923 and 1922 is as follows:

1924		
	Sales to Dealers	Retail Sales
January .....	61,398	33,295
February .....	78,668	50,008
March .....	75,484	55,845
April .....	58,600	89,610
May .....	45,965	84,686
June .....	33,983	66,146
Total .....	354,098	379,590
1923		
January .....	49,162	30,464
February .....	55,427	41,448
March .....	71,669	74,137
April .....	75,822	97,667
May .....	75,393	89,317
June .....	69,708	75,952
Total .....	397,181	408,985

## SPAIN ORDERS TIRES SERIALLY NUMBERED

WASHINGTON, July 14—Tires and tubes which form part of the original equipment of automobiles imported into Spain must bear serial numbers, according to a cable from Assistant Trade Commissioner James G. Burke, Madrid, received in the Department of Commerce. The invoice covering shipment must show these serial numbers.

This is the result of a customs decision by which tires and tubes imported, as part of the original equipment of automobiles, are made subject to the Spanish requirement that all tires and inner tubes imported into Spain must bear serial numbers, and that these numbers must be shown on the invoice accompanying the shipment. The requirement, as regards tires and tubes imported by themselves, has been in force since July, 1923, but under the new ruling it makes it obligatory upon exporters to that country to show this information on invoices even when tires are sold as part of the complete unit.

1922		
January .....	16,088	11,520
February .....	20,869	14,795
March .....	34,082	29,615
April .....	40,474	48,353
May .....	46,736	51,983
June .....	48,541	47,058
Total .....	206,790	203,324

It will be noted from the above that retail sales for the first half of this year are 93 per cent of the corresponding period of the previous year.

## Class Journal Co. Elects Musselman President

NEW YORK, July 14—C. A. Musselman has been elected president of the Class Journal Co., succeeding the late Horace M. Swetland. Mr. Musselman formerly was vice-president and general manager. He is also president of the Chilton Co. of Philadelphia.

Other officers elected were: A. B. Swetland, vice-president and manager; W. I. Ralph, vice-president; E. M. Corey, treasurer; Harry Tipper, secretary.

## HUDSON-ESSEX PRICES

DETROIT, July 14—Official announcement of the new Hudson-Essex prices is made as follows:

	Old	New
Essex Phaeton .....	\$850	\$900
Coach .....	975	1,000
Hudson Speedster .....	\$1,425	\$1,400
7-pass. Phaeton .....	1,500	1,500
Coach .....	1,550	1,500
5-pass. Sedan .....	2,145	2,150
7-pass. Sedan .....	New	2,250

## Washington Analyses British Tax Removal

### Lowering of American Prices Will Stimulate Further Sales to English Consumers

WASHINGTON, July 17—Word that the British import duties, popularly known as the McKenna Duties and in effect since 1915, will be removed Aug. 1, 1924, has been received here in cable dispatches from London and is hailed by the Automotive Division of the Department of Commerce as "one of the most important developments in automotive foreign trade in recent years." The duties have amounted to 33 1-3 per cent ad valorem c.i.f. Despite the tariff barrier which has stood unchanged for nine years, more than 7000 passenger cars were shipped from the United States to the United Kingdom last year.

This action will open the way to American automotive manufacturers, who undoubtedly will reduce their prices somewhat in the British field, thereby giving stimulus to further sales. The popularity of American automotive products is unquestioned, Assistant Trade Commissioner William M. Park at London advises, and their low prices give them further preference. Future prospects for increased trade therefore may be regarded as brighter than at any other time since the inception of the motor industry.

#### Effects on Canada

Effect of removal of the McKenna Duties on automotive shipments from Canada appears somewhat problematical. The principal effect will be the loss of a tariff preferential which Canadian-built cars shipped to the United Kingdom have enjoyed.

During the time the preferential rate has been in force, a number of leading American manufacturers have established branch plants in Canada, and have exported a large proportion of their output. It is now feared that this trade may be lost entirely to Canada as well as that of other parts of the Empire. At present it is the practice of American companies with plants in Canada to keep most of their export business in one plant. When they make cars for export to Britain here they also make some cars for other export to other countries, American Consul General Albert Halstead at Montreal, Quebec, confides to the department. He expresses the opinion that both will be transferred to the United States.

The McKenna Duties placed a charge of 33 1-3 per cent upon foreign automobiles entering Great Britain but allowed a preferential rate of 1/3 in favor of automobiles of Empire origin. By this tariff Canadian cars were entitled to enter the British market under a 22 2/9 per cent rate as compared with a rate of 33 1-3 per cent on American

(Continued on page 188)



## British Trade Plans for Tariff Removal

### Price Changes Mark Preparations of Importers for Lifting of Ban on Aug. 1

LONDON, July 8—Automobile importers' intentions as to sales campaigns after Aug. 1 are gradually taking shape. A prominent advertisement has appeared in the trade press inviting dealers to make application for valuable concessions for well-known American cars. Mathis, too, is advertising for dealers, quoting reductions in price between £45 and £80. It has been stated that the Fiat Works at Turin intend increasing production by as much as 80 per cent in anticipation of greater sales in the British market. The Ancona Motor Co., Ltd., 78-82, Brompton Road, London, S. W. 3, have been appointed sole concessionaires by the Hupp Motor Car Corp. in succession to H. M., Ltd.

Renault has published a list of prices that will come into effect subject to the removal of duty on Aug. 1, amounting to £40 in the case of the 8.3 hp. model up to £285 in the case of the 45 hp. model. De Dion-Bouton, despite an earlier declaration to the contrary, now states that the prices of 1925 models will be reduced.

#### General Motors Reduces

General Motors has announced reductions as from June 2, but states that owing to the general tendency in the rise of production costs no guarantee can be given as to the maintenance of reduced prices. Studebaker takes the same line in announcing £360 as being the temporary price of the standard tourer. Ford definitely states that prices will be reduced when the duties lapse.

Additions to the cars on which refunds have already been promised are Gwynne, Horstman, Hotchkiss and Isotta Fraschini. Delaunay Belleville, in addition to reduction already made, will make a further reduction when the duties are finally abolished. Durant, Ballot, Peugeot, Willys-Knight and Citroen all announce August prices. The Austrian Steyr is the latest car to be placed on this list, while the ultimate reduction of the Lorraine is expected to be £100.

The four-cylinder A. C. two-seater has been reduced by £24, while the same firm announces the production of a new 12 hp. model costing £275. The Rhode states that its price will not be cut, while Belsize Motors announces that its 14-30 hp. six-cylinder model will be increased in price.

The impending remission of the duties has not yet affected British output to any marked degree, but a retrograde tendency is anticipated during the next 12 months.

Several accessories have fallen in price, among which might be mentioned the Houdaille shock absorber, the Stewart speedometer, the Aerolite piston and the Twinbar spring bumper.

## With Old Vehicles Wearing Out, Truck Business Cannot Help but Be Good, If Overproduction Is Avoided

AN INTERVIEW WITH WALTER E. PARKER,  
President of Commerce Motor Truck Co.

By D. M. McDonald,  
Detroit News Representative of the Class Journal Company

**B**USINESS in the motor truck field is set for a long period of prosperity providing the mistake of over-production is avoided. General business of the country today is in need of trucks and they are being sold generously in practically every section. There is no reason why this condition should not continue providing manufacturers do not load the market.

The market today is practically clear of any or all stocks of trucks and there is scarcely a dealer or factory anywhere in the country which has any that are slow in moving. That is the reason the truck business is good at this time, says Walter E. Parker, president of Commerce Motor Truck Co., and it will stay good as long as such a condition permitting sound merchandising exists.

Business in the truck field could not help but be good now if for no other reason than that it has been poor for several years past. There has been some truck buying throughout this period, said Mr. Parker, but there has been nothing that could be termed a demand. Truck users were simply carrying on with the trucks they had—making them do and wearing them out, and there was not enough increase in general business to set up a real need for many new ones.

Now the trucks that have been used during this period are wearing out and have to be replaced. It was inevitable that when these wore out they would have to be replaced, and it was the finest thing that could happen for the truck manufacturers to have owners wear out their old trucks sooner than seek to trade them in on new vehicles.

Attempts by manufacturers to force the market by taking in old trucks on new ones have proven futile. There is only one economic method of handling the truck business and that is to have owners use them until their usefulness is exhausted and then scrap them. There is no market for used trucks in the same sense that there is a market for used cars. Attempts by manufacturers and dealers to develop used truck markets have only resulted in creating irresponsible truck operators who have injured the business and standing of legitimate truck men, Mr. Parker holds.

The period of depression in the truck field through which we have gone has resulted in the clearing away of all post-war vehicles and stocks built up by manufacturers in anticipation of war orders, so that today the truck industry has a chance to start off with a clean slate. Dealers have no stocks and are not desirous of taking on any, but they are after orders and are passing them on to factories in increasing number.

Most of the orders now being received at factories are of this kind and shipments have to be made immediately to meet the business. This is not the best condition under which to operate a factory but it is much better than operations resulting only in passing on vehicles into dealer stocks.

In a sense the truck industry is in a fortunate position today through the sacrifice sales and auctioning off of war vehicles. Many trucks were placed with users through this means which probably would not have been placed for several years through regular merchandising channels. These trucks are now passing out of economic usefulness in large numbers and have to be replaced with standard vehicles. Thus manufacturers are reaping a benefit from a situation which for a long time presented serious difficulty.

Buses likewise are coming into more general use all the time, rounding out a large volume of business. All these factors combine to make the outlook for profits in the truck field much better than for a long time past. It is up to manufacturers to preserve its possibilities by preventing overloading.

## Worm Gear Company Doubles Its Capacity

CLEVELAND, July 14—Immediate construction is to be started in Cleveland on a new \$200,000 factory and office building for the Cleveland Worm and Gear Co., according to Howard Dingle, vice-president of the firm. The new factory will make possible nearly a 100 per cent increase in production of worm gearing for the automotive industry, as well as an increase in output of worm gear speed reducers for industrial uses.

Mr. Dingle states increased demands for the company's products will practically absorb all of the enlarged production of the new factory. The plant is to be completed within 90 days, and provides a total floor space of 45,000 sq. ft. in the factory unit in addition to that to be given over to offices.

The company, founded in 1912, will give up its present plant entirely and move to its new quarters in what is known as the H. K. Ferguson Co. industrial tract, located in the newer industrial district of Cleveland.

## Trade Scouts Report to N. A. C. C. Directors

**Moderate Business Until Fall  
Predicted—Dealers' Stocks  
Above Seasonal Normal**

Buffalo, July 17—Directors of the National Automobile Chamber of Commerce are holding their regular monthly meeting here today, following a session yesterday at which the proposed renewal of the cross licensing agreement was discussed.

This Buffalo meeting is an annual event, the directors being guests of President Charles Clifton, this being his home town. Therefore, there are few absent.

As usual, the meeting received the condensed summary of conditions as prepared from reports from various centers. This survey confirmed the unofficial reports of a light business in June. The situation, however, is relieved by predictions of a moderate trade in most quarters until fall. Used car stocks seem well liquidated and credits are satisfactory. At most points stocks of new cars appear to be above seasonal normal.

The two field men on the N. A. C. C. staff contributed interesting reports from their sections. As viewed by the Midwest representative, the situation is summed up as follows:

Conditions spotty. Some leading lines better in the past six months than in 1923. June generally slower than May. Used car situation favorable in most cities in this region, with stocks low and sales active.

Retail business better than wholesale in Indianapolis, with sales better in industrial towns than on farms. Chicago new car registrations are one-third under the same month in 1923, with heaviest losses in some of the lower priced units; some of this falling off, dealers say, is only apparent as owners held off registering until July 1 to obtain lower license rate.

The representative on the Rocky Mountain and Pacific Coast zone reported as follows:

Utah is in the most favorable position in the Coast and Rocky Mountain group. Sales of passenger cars in this State probably will run ahead of all previous years. Truck market is continuing favorable in Oregon. Few dealer failures, probably fewer than bank failures. Bankers critical of production schedules and tightening on wholesale credits. New car sales probably 9 per cent and new truck sales 11 per cent under last year for first six months' period. Lack of rainfall hurting crops in eastern Washington, Oregon and Idaho. Arizona and Montana markets curtailed by inactivity in mining. Southern California suffering from drought. General outlook in 11 furthest west States indicates light business for several months.

### DEATH OF R. T. WALSH

DETROIT, July 14—The funeral of Robert T. Walsh, one of the most widely known advertising men of the city, was held this week, Mr. Walsh succumbing suddenly to an attack which followed a recent serious illness. Starting with the Ford Motor Co. as an assistant in the advertising department, Mr. Walsh later was advertising manager of the Briscoe

## Business in Brief

*Written exclusively for AUTOMOTIVE INDUSTRIES by the Guaranty Trust Co., second largest bank in America.*

NEW YORK, July 14—There were renewed indications last week of an improved attitude respecting the business situation and outlook. Although wholesale trade remains more than seasonally dull, retail trade is better, particularly in the Middle West, where more favorable crop conditions and rising prices of farm products have stimulated optimism.

The price of wheat has moved consistently upward, and on Monday of this week rose nearly five cents a bushel on the publication of estimates forecasting a Canadian crop about half as large as that of last year. The price of corn has followed a similar course in response to the small crop forecasts. Cotton has held firm despite improved weather reports.

Production of steel ingots in June amounted to 2,056,466 tons, comparing with 2,628,261 in May and 3,767,256 in June of last year. The average daily output of 82,259 tons compares with 97,343 in May and 144,894 a year ago, and is the smallest monthly figure in more than two years. Unfilled orders on the books of the United States Steel Corp. on June 30 amounted to 3,262,505 tons as against 3,628,089 a month earlier and 6,386,261 at the close of June last year.

Preliminary foreign trade figures for June show exports of \$307,000,000 and imports of \$277,000,000, compared with exports of \$335,000,000 and imports of \$303,000,000 in May, and exports of \$320,000,000 and imports of \$320,000,000 in June of last year. For the fiscal year ended June 30, exports were \$4,312,000,000, and imports \$3,557,000,000, as against exports of \$3,957,000,000 and imports of \$3,781,000,000 in the preceding fiscal year.

Car loadings in the week ended June 28 numbered 908,355, comparing with 903,700 in the preceding week and 1,022,471 a year ago.

Cotton consumption in June totaled 350,377 bales, as against 413,649 in May and 542,026 in June of last year. The latest figure is the smallest monthly total since December, 1920.

Fisher's index of wholesale commodity prices stood at 142.3 last week as against 143.2 in the preceding week and 142.7 two weeks earlier, reaching a new low figure for the year.

Motor Car Co., and in the past few years had been identified with the O. J. Mulford agency.

## H. B. Bloomer Retires as Dodge Chairman

**President Fred J. Haynes and  
Other Officers Reelected—Russell Huff Chosen Director**

DETROIT, July 15—All present officers and directors of Dodge Brothers, Inc., were reelected at the annual meeting today, with the exception of Howard B. Bloomer, chairman of the board, this office being abolished by adoption of a resolution. The retirement of Mr. Bloomer is due principally to his long illness which has necessitated his severance of all business activity.

Mr. Bloomer had been chairman of the board since the death of Horace E. Dodge, organizing the form of control under which the company now operates. For many years he was personal counsel for the Dodge brothers and for the company, and following their deaths, was executor and trustee of both estates. He has been ill for several years and this, coupled with an accident suffered during the past year, brought about his desire to retire from active work.

Russell Huff, chief engineer of the company for nearly 10 years, was elected as a new member of the board. The addition of Mr. Huff to the board is in recognition of his long and efficient service with the company and of his outstanding position in the engineering field. He is a former president of the Society of Automotive Engineers and one of the pioneer designers of the industry.

The officers chosen were Fred J. Haynes, president and general manager; A. T. Waterfall, vice-president; John Ballentyne, treasurer; Harry V. Popeney, secretary and assistant treasurer; and R. J. Fry, assistant secretary.

According to a statement at the meeting, the last fiscal year was the largest in Dodge Brothers history.

## Tiger Roadster Added by Columbia Motors Co.

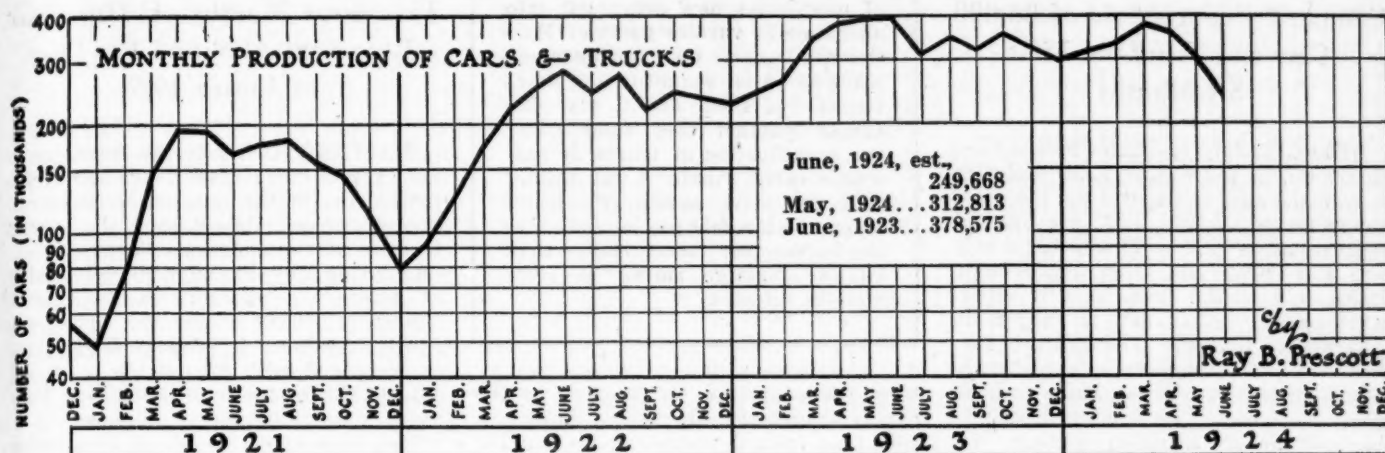
DETROIT, July 14—A new sport roadster known as the Tiger, finished in yellow and green body molding and black running gear, has been brought out by the Columbia Motors Co. Equipment includes balloon tires, disk wheels, snubbers, combination stop and taillight, nickel radiator and headlights, motometer, bar lock, radiator cap, automatic windshield wiper, rearview mirror, cigar lighter, step and scuff plates, front bumper, divided rear fender bumper, spare tire and cover, windshield wings, spotlight, transmission lock and parking light. The price is \$1,775.

### JOHN A VEY DEAD

ERIE, PA., July 15—John A. Vey, general superintendent of the Continental Rubber Works, died yesterday. Mr. Vey had been Continental superintendent since the beginning in 1903.



## JUNE OUTPUT ESTIMATED AT 249,868



### Drop in Production 20 Per Cent from May

Lowest Total Reported by Industry Since January, 1923—  
2,002,024 in Six Months

NEW YORK, July 16—As figured by the National Automobile Chamber of Commerce, based on shipping returns, June production of cars and trucks is estimated at 249,868. This is 20 per cent under May, with its total of 312,813, and 6 per cent under the Class Journal survey of two weeks ago.

N. A. C. C. figures were not announced at the usual time this month, because the directors' meeting was not scheduled until the 17th at Buffalo.

This drop in production from May is said to be confined to passenger cars, reports showing that the truck industry is holding up to about its usual quota of 30,000 vehicles a month. The passenger car slump had been expected because of the factories curtailing production when it was found that the retail market had slowed because of weather conditions, etc.

The report also shows that this June is the smallest production month since January, 1923, when 243,554 cars and trucks were turned out. Compared with June, 1923, it is 34 per cent under.

Production for the first six months of this year was 2,002,024, as compared with 2,031,093 in the corresponding period of 1923.

### Middle West Favors Uniform Traffic Laws

DES MOINES, July 14—Recognition of the recommendations of the automobile headlight code will be given, where applicable, in the draft bill on headlights before its final adoption by the Conference of Motor Vehicle Commissioners of the Middle Western States, it was de-

### N. A. C. C. Estimate Gives Production of 249,868 Cars and Trucks in June, a Drop of 20 Per Cent from May

NEW YORK, July 16—Shipping figures received by the National Automobile Chamber of Commerce place June production at 249,868 cars and trucks, a decrease of 20 per cent in comparison with May, when the revised total was 312,813. In June, 1923, production was 378,575.

The following table gives the statistics for the first six months of 1923 and 1924:

	Output		Carloads		Driveaways		Boat	
	1924	1923	1924	1923	1924	1923	1924	1923
January	316,224	243,554	46,559	35,223	40,976	30,031	1,018	728
February	376,524	276,955	49,219	36,165	48,300	43,613	1,100	882
March	382,456	355,073	54,286	44,983	41,545	62,988	500	1,908
April	373,139	382,746	49,400	46,095	36,628	60,467	4,056	5,027
May	312,813	394,190	35,400	45,095	32,700	62,346	8,295	12,312
June	249,868	378,575	25,988	40,281	25,142	59,099	7,300	13,492

Factory shipments and output for the other months of 1923 and 1922 follow:

	Output		Carloads		Driveaways		Boat	
	1923	1922	1923	1922	1923	1922	1923	1922
July	328,063	247,186	32,623	29,116	46,837	28,100	10,131	7,030
August	345,271	274,209	38,319	32,817	45,958	36,768	10,053	10,104
September	327,506	207,206	35,986	26,335	39,653	30,177	8,463	8,118
October	365,162	239,406	42,236	27,100	37,947	35,203	7,663	7,605
November	312,996	237,329	38,133	27,232	32,859	27,376	6,413	5,070
December	303,201	228,410	34,984	27,244	27,608	26,743	4,000	1,307

Motor vehicle production segregated as to cars and trucks is as follows:

	1923			1924	
	Cars	Trucks		Cars	Trucks
January	223,822	19,732	December	275,439	27,762
February	254,782	22,173			
March	319,789	35,284			
April	344,661	38,085			
May	350,460	43,730			
June	337,402	41,173	January	287,302	28,922
July	297,371	30,692	February	336,373	31,151
August	314,399	30,872	March	348,350	34,106
September	299,928	28,578	April	337,037	36,102
October	335,023	30,139	May	279,439	33,374
November	284,923	28,073	June	219,868	30,000

cided at the conference held here last week. The code, which is being drawn under the auspices of the American Engineering Standards Committee is nearly completed.

The conference went on record as in favor of a uniform traffic law in all States, regulating the operation of motor vehicles and other uses of the highways by adopting unanimously a resolution of that purport. A committee was ap-

pointed to effect a cooperative arrangement with the Eastern Conference of Motor Vehicle Commissioners for bringing about uniform traffic laws.

Fred. R. Zimmerman, Secretary of State, Wisconsin, was reelected chairman; J. P. Bengtson, Assistant Secretary of State, Minnesota, reelected vice-chairman, and Sidney J. Williams, Director Public Safety Division, National Safety Council, elected secretary.

## Ford's Export Trade Ahead of Last Year

Company Reports Sale of 88,000  
Cars and Trucks in First  
Six Months

DETROIT, July 12—Sales by the Ford Motor Co. in the export field, exclusive of Canada and of exports by the Ford Motor Co. of Canada, Ltd., are fixed at approximately 88,000. This includes only cars and trucks and is an approximate figure only in the sense that it represents cabled figures and is subject to confirmation by mail. The figure is further rendered incomplete by the absence of final figures from Sao Paulo branch, which have been interfered with due to the revolutionary situation existing.

The approximate total of 88,000 represents important gains over the first six months of 1923, all branches figuring in the increase. Total foreign sales by the American company in 1923 were 147,462. Of the business of the first six months, approximately 25,000 of it was done in the Latin American countries, and the remainder, or about 63,000, in the European countries served through the Ford branches under the control of the American company, and in far eastern companies also controlled from the offices here.

Outlook in the general foreign field is described by the company as excellent, and important developments are expected to continue. The Stockholm branch, recently opened by the company to supervise sales throughout Sweden and serve dealers in Finland, is reported making excellent progress. The opening of the Stockholm branch was to improve facilities in the Scandinavian countries, Copenhagen continuing to be the main assembling branch in that territory.

### German Plans Indefinite

Plans for operation in Germany remain indefinite pending the conclusion of treaty arrangements. The company is doing considerable shipping into the German occupied territory and has a large number of dealers operating there.

Sales of Fordson tractors in the foreign territories for the first six months of the year were 6432, a record-breaking total, and exceeding sales for the entire year of 1923. The company is particularly pleased at the increase in tractor business in the foreign territories as indicating not only a definite step toward improved agricultural methods, but also as laying a foundation for generally better economic conditions.

Increased business in tractors was general in every country in which the Ford company has assembly or sales branches. Throughout South America and Europe each branch showed an increase which was practically identical, approximating 20 per cent in each instance.

Practically every tractor sold, the company declares, will be used for agricul-

## BAY STATE TAXES BUS AS PASSENGER VEHICLE

BOSTON, July 14—Registration of new buses now being put into operation in various parts of Massachusetts came up a few days ago when an owner sought to get plates for one of them and it was discussed whether they came under the classification of trucks or passenger cars. Finally it was decided that they were passenger vehicles and as such would pay according to the horsepower rating rather than on the tonnage rating of commercial vehicles.

ture, the campaign for tractors in the export field being practically limited to this time toward promoting its use for agricultural purposes. Some tractors are being sold for commercial purposes in the export field—Holland recently taking over a considerable number for towing canal-boats, but the large majority go to agriculturists.

## English Factory Site Bought by Ford Company

DETROIT, July 11—Confirmation of the purchase by Ford Motor Co. of a 300-acre factory site on the Thames at Dagenham, Essex, beyond the east end of London, has been made at Detroit offices here, the purchase and confirmation having been pending for some time past. No statement will be made by the company here, however, as to its plans for the new factory or its relation to its present manufacturing activities at Manchester.

Original plans called for the erection of a factory employing 10,000 men and producing 500 cars daily. H. S. Jenkins, manager of the Ford interests in England, in a statement there, said, however, the carrying through by the company of its original plans would depend on modification of the present automobile tax of one pound sterling per horsepower.

In his statement Mr. Jenkins further said abolition of the 33 1/3 per cent duty on foreign automobiles would make manufacture of Ford cars in England an uncommercial proposition, but the company would not be deterred on that account. The statement coming from Mr. Jenkins was authorized by the Ford company here and sets forth the official position of the company with relation to operations in England.

## FORD RUSHES ST. PAUL PLANT

ST. PAUL, MINN., July 14—Opening of the new plant of the Ford Motor Co. has been advanced from July 15, 1925, to Jan. 1, 1925. This is due to the increased distribution from the Minneapolis assembly plant, notwithstanding reports that have been circulated of depression in the Northwest.

## May Export Returns Show Big Increases

First Five Months of This Year  
Represent About 58 Per Cent  
of Entire 1923

WASHINGTON, July 14—Increases in the exports of passenger cars and motor trucks and in the number of American cars assembled abroad were the salient features of the automotive export situation during May, although the total value of automotive products exported were almost \$2,000,000 below the figure for April, amounting in May to \$20,966,227, as compared with \$22,829,150 in April, \$21,226,273 in March, \$19,566,226 in February and \$18,465,202 in January.

The tremendous value of automotive shipments from the United States is shown by the fact that during the first five months of this year their aggregate value has been \$103,053,078, or about 57.7 per cent of the total value of the entire year of 1923.

Based on revised figures, it is shown that passenger cars exported from the United States and Canada during May numbered 18,665, compared with 18,123 in April; and trucks to the number of 3800, compared with 3170 in April. In both cases the increases were due to a sudden spurt in the exports from Canada. American car assemblies in foreign countries also increased materially, reaching the figure of 12,850 in May as compared with 11,307 in April.

Production in the United States and Canada in May amounted to 321,397 cars and trucks, a decrease of 16 per cent from the 382,033 figures of April. On the basis of these figures, the ratio of exports to production during May was 7 per cent. If foreign assemblies are counted as exports, the ratio rises to 10.98 per cent.

Exports of passenger cars from the United States alone receded somewhat from the figures for April, but the large increase in exports from Canada brought the total figure above that for the preceding month. In trucks and buses shipments from Canada during May were in excess of those in April.

Australia and Sweden remained the leading national markets of the United States in cars and trucks respectively, Sweden retaining first position in truck demand after its unprecedented increase during April.

## MAKING FORD SPECIALTIES

CLINTONVILLE, WIS., July 14—The Patterson Manufacturing Co., organized recently at Clintonville, Wis., with \$50,000 capital stock, intends to enter the manufacture of Ford specialties and general automotive equipment. The promoters, all Clintonville men, have perfected a motor drive for speedometers and a governor for Ford truck engines which will be the principal products at the beginning of its operations.



## High Speeds Shown by Small Motorcycles

Ultra-Lightweights Average 51.2  
m.p.h. in Tourist Trophy Tests  
on Isle of Man

LONDON, July 5 (by mail)—The British motorcycling world has realized with a gasp of astonishment the speed capabilities of the ultra-lightweight class of machine, proved by its performance in the Isle of Man races run off during the week commencing June 23 and known collectively as the Tourist Trophy contests.

In full touring kit, as insisted upon by the rules, the winner of the 175 c.c. race (1½ hp. by Auto Cycle Union rating) averaged 51.2 m.p.h. in covering three circuits of the course (113 miles in all). The course is extremely hilly and often termed mountainous, as well as comprising a large number of bad corners and some acute hairpin bends. The first six men to finish averaged over 40 m.p.h.; the first four, over 48 m.p.h.

This is the first year in which a class for ultra-lightweights has been included, for the type until last autumn had hardly come to be recognized as a practical kind of machine for everyday use; but it is safe to assert that the demand for this class of two-wheeler will increase by leaps and bounds from now on, if only because of a removal of the previously held idea that its maximum and average speed capabilities were in the region of 30 m.p.h. and 20 m.p.h. respectively.

### New Gerrard Winner

The winner's machine was a 1.74 hp. New Gerrard, the only representative of this make in an entry list of 17 machines comprising ten different makes. It had a single-cylinder four-stroke Blackburne engine with overhead valves, resembling though not identical to the standard model supplied by the Blackburne Co. for this type of machine. Its bore and stroke are 50 x 88 m.m. and it had its counterparts on the two Cotton machines which ran second and third, both with an average of 49.8 m.p.h.

In the lightweight (250 c.c.) class an amateur finished first in covering six laps (226 miles) with an average of 55.44 m.p.h., while in the junior race (350 c.c. machines) his brother completed the same distance and won at an average of 55.67 m.p.h., less than a minute separating their respective times, though the races were run on different days.

All previous records were broken in the senior event (for machines up to 500 c.c.), the winner, on a single-cylinder Norton, of 490 c.c. averaging 61.64 m.p.h. The previous best (58.31 m.p.h. in 1922) was beaten also by the next four men to finish, two of whom exceeded 60 m.p.h. (61.23 and 60.17 m.p.h.). The second man was riding a 498 c.c. Scott, which has a water-cooled two-cylinder two-stroke engine, with the separate cylinders inclined and side by side. A Douglas with a 497 c.c. horizontally opposed two-

cylinder engine was third, while the fourth man was on a 499 c.c. Ricardo-engined (four valve, single cylinder) Triumph.

Among the 15 finishers of 31 starters in the senior were two Peugeots, which were represented in this race for the first time, together with half a dozen other imported machines. No American competitor appeared this year in any of the five races, the fifth of which was for sidecar outfits.

This latter event was won at an average of 51.31 m.p.h. on a Norton (588 c.c. single-cylinder), which made had 10 entries in the senior solo class, one of which (as recorded above) got home first.

The junior race attracted the biggest number of entries, viz., 59 of 23 different makes, the A. J. S., which had had four previous wins, failing to secure anything better than third this year despite 10 machines of that make being entered.

## Safety Education Aim of Hoover Committee

WASHINGTON, July 14—Ten thousand lives of school children could be saved annually by closer attention to education along safety lines, it was agreed at a round table discussion of the committee on education of the Joint Conference on Street and Highway Safety.

The meeting was held in the Department of Commerce and was one of the series of gatherings of experts through whose advice Secretary Hoover is seeking the best means of reducing the terrific loss of life and limb due to traffic accidents.

The work of the committee, as a result of the discussion, will be divided into three groupings. One will deal with what is being done in public and private schools, normal schools and colleges and how better methods can be devised.

A second will emphasize the special training of groups of professional drivers such as employees of taxicab and trucking companies.

The third will be devoted to questions of education as applied to the general public, with special attention to subjects of educating drivers, pedestrians and of stimulating the work of community safety organizations.

It was decided to hold the next meeting on July 26 in Atlantic City, immediately following the meetings of the traffic control and city planning committees.

### JAPAN EXEMPTS AUTOMOBILES

WASHINGTON, July 15—Automobiles and cameras are the two exceptions in the new schedule of tariff revisions now being considered by the Japanese Government, which is now considering the doubling of import duties on luxuries. A bill is now before the Japanese Diet, doubling the import duties on all commodities except the two named, according to a cable received by the United States Department of Commerce from Acting Commercial Attache Elwood G. Babbitt, at Tokyo.

## Balloons on Vulcan Mark English Change

Veteran Builder First to Offer  
New Type as Standard  
Equipment

LONDON, July 1—(by mail)—One of the oldest of British motor manufacturers, the Vulcan Co., has adopted balloon tires as standard equipment in introducing a new 12 hp. model, and is thus the first British maker to do other than offer low-pressure tires as an option.

The new car has a four-cylinder L-head engine with a bore and stroke of 69 x 100 mm. (approximately 90 cu. in.) magnetic ignition, splash and pressure lubrication, unit-construction, with dry plate clutch and a four-speed gearbox having right-hand control. The tire equipment consists of 28 x 5 in. Dunlops, and the price with a four-passenger body, including framed side panels for the folding top, is £295.

Another new model is announced by the Talbot Co., one of the constituents of S. T. D. Ltd. (Sunbeam-Talbot-Darracq) of which L. Coatalen is chief engineer. As might be surmised the new Talbot bears close resemblance to Sunbeam models; it has a six-cylinder engine with a bore and stroke of 70 x 110 mm., approximately 2½ litres capacity.

Pushrod-operated valves are used, aluminum pistons, seven-bearing crankshaft, unit constructed three-speed gearbox, single plate clutch, enclosed propeller shaft, cantilever springs at the rear and four-wheel brakes on the Perrot-Sunbeam system; from all of which it will be inferred that there is nothing unorthodox about the design. The chassis price is £675, or £825 with a five-passenger open body.

## Ogren Receiver Says Creditors Get Nothing

MILWAUKEE, July 14 — Neither stockholders nor creditors of the defunct Ogren Motor Car Co. of Milwaukee will get a return on their investment or claims, it was stated by Julius J. Goetz, receiver, after being granted confirmation of his sale of the available assets for \$3,000 to the Huffman truck interests of Elkhart, Ind. The property consisted of frames and other parts and a small quantity of tool equipment. The claims of creditors amount to more than \$25,000, but unpaid tax claims of the Government and the city of Milwaukee are in excess of \$3,000, so the entire revenue from the sale of assets will apply on taxes.

The Ogren company was founded by Hugo W. Ogren and for several years built the Ogren Six in a limited way on practically a custom-built basis. The plant closed nearly two years ago, and receivership proceedings were instituted about a year ago.

## Men of the Industry and What They Are Doing

### Honors for Sparks' Zouaves

Capt. William Sparks, head of the Sparks-Withington Co. of Jackson, Mich., and leader of the Jackson Zouaves, made up of prominent business men of Jackson, brought his company east and captured national honors. After winning first prize for drilling in the Elks' convention at Boston, the fifth consecutive time the Jackson company had achieved this honor, Captain Sparks invaded West Point, where for the first time in the history of the United States Military Academy, a civilian drill team was permitted to drill there, giving an exhibition for the cadets and their commanding officers. The Jackson Zouaves as an organization are 21 years old.

### Cullen in School Work

T. F. Cullen, for five years editor of the Automobile Trade Journal, has been appointed special instructor of business by the Michigan State Automobile School. The course is offered as an additional free service to all its students and comprises business management, garage management, systems, accounting, advertising, salesmanship as related to the automotive service shop and kindred subjects. One feature is the explanation of the flat rate system of repair charges.

### Bragg Given New York Job

Directors of the Automobile Merchants Association of New York City announce the appointment of Harry G. Bragg as general manager, to fill the vacancy caused by the retirement of C. F. Rhoades, who was acting general manager. Mr. Bragg has been sales manager of the P. Brady & Sons Co. of this city, and while he never has been in the industry, he is well acquainted among the dealers.

### Foreign Trip for Clingan

R. E. Clingan, general manager of the Bock Bearing Co., Toledo, Ohio, has sailed for Europe to negotiate with interests in Germany and France for the manufacturing rights of Bock taper roller bearings on the Continent. He also will spend some time with British Bock Bearings, Ltd., London and Glasgow, which concern has the manufacture and sale of Bock bearings for Great Britain and the British overseas possessions.

### Hudson Heads Simplified Practice

Ray M. Hudson has been named to succeed William A. Durgin as head of the Division of Simplified Practice of the Department of Commerce. Mr. Hudson has been assistant chief of the division since it was created. Before coming into the division Mr. Hudson was for some years connected with the automotive industry and was formerly with the Franklin Automobile Co. of Syracuse,

N. Y., and later with the Holt Manufacturing Co. of Peoria, Ill.

Mr. Durgin, who for two and a half years has been at the head of the division, has left his government activity to resume his former post with the Commonwealth Edison Co. of Chicago, from which he was borrowed by Secretary of Commerce Hoover when the latter established the Division of Simplified Practice to help industry eliminate waste through the reduction of excess varieties.

### Kelley Off for Australia

Martin J. Kelley, for nearly four years associated with the Yellow Cab interests at Chicago, has sailed from San Francisco for Australia on the important mission of installing the first fleet of taxicabs in that nation. He expects to reach Melbourne on Aug. 1. The initial fleet will number 300 cabs. Later Mr. Kelley will proceed to the Orient and undertake similar activities in Japan and China. He is acting as personal representative of John Hertz, president, Yellow Cab Mfg. Co., and in all his absence will be one year.

### W. S. James Joins Hupp

W. S. James, who for several years has held the title of physicist at the Bureau of Standards, has resigned from that position and now is located with the Hupp Motor Car Corp., Detroit, where, it is understood, he will engage in engineering and experimental work. Mr. James is well known in the automotive industry, due largely to the prominent part he has taken in research work done at the Bureau of Standards, where he served as chief of the power plants section of the heat and thermometry division, of which Dr. H. C. Dickinson is in charge.

It is understood that Stanwood W. Sparrow, who has been associated closely with Mr. James, will succeed to the position which he has left vacant.

### Harry J. Swanson Changes

Harry J. Swanson has resigned as general sales manager of the Peerless Machine Co., Racine, Wis., a position he has held since 1922, to become vice-president and treasurer of the Detroit Piston Pin & Manufacturing Co. Prior to 1922 Mr. Swanson was for six years vice-president and sales manager of the Detroit Machine Tool Co.

### Rawson on Rollin Staff

The Franklin Automobile Co. has discontinued its merchandising department, following which both Clyde Jennings and R. A. Rawson have severed their connections with the company. Mr. Rawson has joined the Rollin forces as factory representative in the Atlanta territory.

## Fifth of Road Income Paid by Car Owners

### Government Reports Collection of \$225,784,931 from Motor Vehicle Sources in 1923

WASHINGTON, July 17—There is a marked tendency to collect a larger proportion of highway funds from the owners and users of motor vehicles, it is revealed here in an analysis of the various sources of highway funds since 1914 made by the Bureau of Public Roads of the United States Department of Agriculture.

In 1914, out of a total highway income of \$240,262,784, the collections from motor vehicles amounted to \$12,382,031, or 5.1 per cent of the total. In 1921, seven years later, the motor vehicle owners and operators paid \$118,942,706 in motor vehicle fees and \$3,685,460 in gasoline taxes, which together equaled 10.6 per cent of the total income for highway purposes.

A similar compilation of payments made by owners and operators of motor vehicles for licenses and permits in 1923 shows a total contribution on their part of \$188,970,992. In the same year gasoline taxes levied by 35 States amounted to \$36,813,939. The motor vehicles, accordingly, contributed a total of \$225,784,931, or 19.5 per cent of the entire 1923 highway income.

A very substantial part of the total highway income, 38.1 per cent, was derived from the sale of bonds.

The average annual expenditure per person per mile of road all over the United States is only 0.0054 cent—one cent for each 200 miles of road. This ranges from 0.0015 cent in the west North Central States to 0.0101 cent per person per mile in the Pacific States.

## War Cars and Trucks Sold for \$16,000,000

WASHINGTON, July 15—World war army surplus supplies costing the Government \$3,764,939,101 have been liquidated since the armistice by the Government. Of this amount approximately \$16,000,000 consisted of automotive equipment, according to figures of the office of the army's chief coordinator. From the total sales, the Federal treasurer has received \$1,295,089,732.

Much of the surplus stock, and especially so in the case of used trucks and automobiles, has been transferred from the War Department to various other departments. The bulk of the automotive equipment went to the United States Bureau of Public Roads for redistribution among the States, to be used in the construction of roads.



## Underwriters Deny Criticisms of Lock

### Coincidental Type Does Not Re- quire Use of Key When Engine Stalls

NEW YORK, July 16—In a news article printed in the July 3d issue of AUTOMOTIVE INDUSTRIES reference was made to the recent action of the National Automobile Chamber of Commerce in notifying members with regard to the attitude of the National Automobile Underwriters' Conference toward the use of coincidental locks.

In that article certain statements were made with regard to the operation of this type of lock which were not accurate and because of which the letter below was written by the Underwriters' Laboratories.

In the operation of this type of lock in its usual form it is necessary to throw off the ignition switch manually before the locking action takes place. That being so, the device does not lock in case the engine becomes accidentally stalled and in such an event it is merely necessary to operate the starter switch to restart the engine.

#### Letter from Underwriters

The letter from the Underwriters' Laboratories follows:

We note in the July 3, 1924, issue of AUTOMOTIVE INDUSTRIES, on page 87, an article in which the statement is made that a coincidental lock "will not permit of an engine idling in cold weather and with the lock operative at the same time, thus robbing the owner of the protection of the lock, while it is also pointed out that if a car so equipped stalled on a railroad track it would be necessary for the driver to use a key to restart the engine, thus losing time that might result in an accident." The article goes on to state that "the underwriters have approved several of this type of lock."

As some of the statements made are not in accordance with the facts, we wish to call your attention to the fact that a coincidental lock must be so constructed that it is necessary to place the locking mechanism in the locked or theft-resisting position in order to break the ignition circuit of the automobile.

While it is true that it is not possible to lock the automobile in cold weather and still idle the motor, nevertheless, we do not consider that this is an objection to a lock built on the coincidental principle in that a great many cities in this country prohibit by ordinance the idling of a motor with the car unattended. In other words, with a coincidental lock it is possible to idle the motor but naturally not lock the car at the same time. It is our opinion that a car should not be left unattended while the motor is idled. Further, we question whether drivers of automobiles would even with the present types of locks idle the motor and leave the car unattended with the lock in the locked position. In the case of any of the present day cars provided with a key-operated ignition switch, it would not be possible to idle the motor and leave the switch in the locked position, so that this criticism of a coincidental lock applies as well to a great many of the present day automobiles which are

## BUS TOURISTS MAKE CROSS COUNTRY TRIP

WASHINGTON, July 17—Traveling in one of the largest buses ever manufactured, a product of the Garford Motor Truck Co. of Lima, Ohio, twenty Chicagoans, composing the first party to make a tour from Chicago to the Atlantic seaboard and return, arrived here this week from Atlantic City. The bus has a smoking compartment for men, space enough for baggage needed on a two weeks' trip and radio equipment. Every passenger has a pair of earphones with which to pick up music and news en route.

The bus left Chicago on the morning of July 6 and the schedule calls for dinner in Chicago on July 19. The tour covers 2380 miles, including the Detroit-Buffalo lake ride. An average of about 150 miles a day is being maintained for the 11 days of actual motor travel. Included in the itinerary is the battlefield of Antietam, Hagerstown, Cumberland, Wheeling, Zanesville, Columbus, Indianapolis, Danville and Chicago, where the tour ends. The crew is composed of a driver, a conductor and a mechanic.

provided with key-operated ignition switches.

The statement that a car equipped with a coincidental lock and which stalled on a railroad track would require the use of a key to restart the engine is not in accordance with the facts, as it would only be necessary to press the starter switch in the same way as with cars not equipped with coincidental locks in order to start the motor.

It is manifest that if a coincidental lock should require the driver to use a key to restart his motor in case of stalling at any point, Underwriters' Laboratories would be open to just criticism, and the statement in the article that the underwriters have approved several of this type of lock is untrue, as no lock has been listed which would require the use of a key in starting the motor should the motor become stalled. We call your attention to the fact that our organization is as much interested in the protection of life and property as it is in the prevention of theft.

We feel that in fairness to manufacturers of coincidental locks and to Underwriters' Laboratories this letter should receive the same publicity as the article referred to.

## National Park Travel Increasing, Is Report

WASHINGTON, July 17—National parks throughout the country are being visited by unprecedented numbers of sightseers, some of whom travel from coast to coast by automobile to get a glimpse of the natural scenic wonders.

Reports to the national park service of the Interior Department say there were 4611 visitors to Yellowstone for the month ended June 15—a 125 per cent increase.

## Another Car Builder to Enter Truck Field

### Units of Two Types, Including Engines, to Be Standardized as Far as Possible

DETROIT, July 15—Announcement is expected to be made within a short time of an agreement between a prominent car manufacturer and a truck maker for the production of a new light truck using the engine of this passenger car builder. Negotiations have been under way for some time and are nearing the point where they will assume definite form.

So far as possible the units of the truck will conform to the units of the passenger car, making it possible for the passenger car dealers to extend national service to purchasers of the truck without carrying additional parts in stock.

With this announcement made, it will find one more prominent car maker having truck affiliations at least insofar as sale of manufactured units is concerned. Practically all passenger car builders in the Detroit district, except in the higher priced lines, now have made connections of this kind or are building and merchandising trucks themselves.

Under the form of agreement between car and truck maker as exemplified in recent connections of this kind, the passenger car company assumes no obligation for the merchandising of the truck, though it permits the sale of these vehicles through the car dealer but entirely at dealer option. Special contracts are gotten out by the truck maker, these contracts covering only the sale of the one vehicle and not the general truck line. These contracts are also so made as not to conflict with the sale of cars.

## Stoughton Expanding Its Truck Business

STOUGHTON, WIS., July 14—A volume of business representing \$1,740,000, practically all in Stoughton motor trucks and motor buses, was reported to stockholders of the Stoughton Wagon Co. at the annual meeting. It was stated that the profit was satisfactory, but instead of declaring a dividend, stockholders agreed that the profit be turned into the working fund so that the output of freight and passenger trucks may be enlarged materially to meet the steadily increasing sales.

Alterations are under way in the shops and some retooling is being done, as the Stoughton concern will now build two types of the engines used in its cars, which formerly were built on contract by the Mid West Engine Co. of Indianapolis. The third type will be furnished by the Allis-Chalmers Mfg. Co., Milwaukee, which also has acquired some of the Mid West rights, tools, etc.

F. J. Veal is president of the Stoughton company. All other officers were re-elected.

## Buenos Aires in 1925 Next Big Road Effort

### Program for Official Pan-American Highway Conference Discussed at Washington Meeting

WASHINGTON, July 15—With the approval of the draft program of the official Pan-American Highway Conference to be held at Buenos Aires in 1925, the Pan-American Highway Commission, the unofficial body of Latin-American engineers which has been in the United States for more than four weeks as guests of the American Highway Educational Bureau and the National Automobile Chamber of Commerce, concluded its labors at the Pan-American Building here on July 5. The draft of program will be presented to the governing board of the Pan-American Union at its next meeting, and will form the basis of the final program of the conference.

As drafted by the commission, the program provides for a division of the conference into two groups, one to deal with matters with respect to which the conference may adopt agreements or resolutions that may be accepted by all the countries of the American Continent; the other to cover matters of a financial and technical character which are not capable of uniform treatment, but the solution of which will depend upon the peculiar circumstances prevailing in each country.

#### Work Laid Out

The first group, it is provided, shall deal with the regulation of highway transit and systems of signs; the international licensing of vehicles; highway nomenclature; interchange of statistical information and legislative enactments referring to highways; and the construction of a Pan-American highway that will unite the capitals of all the countries, members of the Pan-American Union.

Questions of a financial and technical character, such as customs duties on automobiles and road machinery, sources of revenue for highway construction, governmental assistance and the cooperation of the public in the construction of highways, will be referred to the second group. This section also will consider the best methods of highway construction in the various American countries, means of conservation, and adequate means for the education of the public with respect to the importance of highways.

In its report addressed to the director general of the Pan-American Union, the commission also recommends that before the opening of the official highway conference, the countries members of the Pan-American Union forward to the secretariat of the conference complete data relative to highways in the respective republics, including length and condition of highways, amount of capital invested in improved highways, laws governing highway construction, and sources of

revenue for improving means of communication.

Steps also were taken for the creation of an international organization to promote the construction of highways in the American countries. National federations of highways education shall be constituted in the various republics, to be composed of representatives of institutions or associations primarily interested in highway development, these national bodies in turn to form the Pan-American Confederation of Highway Education.

## Army and Navy Heads Reorganize Air Board

WASHINGTON, July 14—To prevent duplication of effort and to procure a complete measure of cooperation and coordination in the development and employment of Army and Navy aviation, the Secretary of War and the Secretary of the Navy have agreed upon a reorganization of the aeronautical board with functions, membership and procedure as set forth by a general order. The order aims to establish coordination and cooperation among the Army, Navy and Marine Corps aviation personnel, equipment, facilities and operations along lines that are intended to avoid opportunity for altercation and conflict.

The membership of the aeronautical board will be made up as follows:

For the Army—The chief of the Air Service, the chief of the training and war plans division of that service and one member of the war plans division of the War Department General Staff.

For the Navy—The chief of the Bureau of Aeronautics, the chief of the planning division of that bureau and one member of the war plans division of the office of the Chief of Naval Operations.

The aeronautical board will investigate, study and report upon all questions affecting jointly the development and employment of the Army air service and Naval aviation referred to it by the heads of the two departments.

## Aeronautical Students Find Jobs in Industry

NEW YORK, July 16—All of the seven in the first graduating class in aeronautics at New York University have found places in the industry. Melville Bachrach and J. l'Hoedene have qualified for appointment at Langley Field with the National Advisory Committee; William Schwendler is allied with Grover Loening; J. Lederer is acting as assistant in the newly erected wind tunnel; W. Boesch in installing beacons and landing lights for the Air Mail, and Gilbert Betancourt and R. Contini are with the Curtiss company.

Prof. Collins P. Bliss is head of the Department of Mechanical Engineering of New York University which graduated this class, while Alexander Klemin is associate professor of aeronautics.

## Ford Sales Run High First Half of Year

### Six Months' Total Is 1,036,978, a Gain of 133,095 Over Same Period in 1923

DETROIT, July 11—Complete reports from all of its 34 assembly and sales branches in the United States as received by the Ford Motor Co. place retail sales of Ford cars and trucks in the first six months of the year at 1,036,978, a gain over the first six months of last year of 133,095, or an average gain per month of 22,182.

These figures are for retail sales in the United States only and do not take into consideration the sales made by foreign branches of the Ford company and associated companies, the majority of which assemble cars from American made parts.

Comparison between sales for the period this year and last indicates not only a remarkable increase in the country's buying power, but also shows that this growth continues month by month, declares the company. In every instance, it notes, monthly sales in 1924 have shown a substantial increase over the corresponding period in 1923. In June sales reached 170,747, approximately 10,000 more than in June, 1923.

The most encouraging sign of the times as indicated by the sales records, the company says, is the fact that this business has been spread very evenly throughout the country and indicates a general prosperity that is not confined to any particular section.

## Campbell Developing Durant's Sales Staff

NEW YORK, July 13—Durant Motors have opened wholesale offices in Philadelphia and Boston for the accommodation and convenience of their dealers in these territories. The establishment of these two wholesale offices are the first steps in the development of a merchandising organization which will include wholesale offices in all principal cities of the country.

Colin Campbell, vice-president, who has taken over the development of the merchandising organization for the Durant corporation, is planning this group of wholesale offices for close contact with the dealer group and is rapidly organizing his personnel to take care of them.

Additions to the sales staff by Mr. Campbell are Thomas H. Keating, formerly sales manager of the Chevrolet Motor Co. at the Atlanta office, who has been made sales manager at Philadelphia; A. Vandergree, formerly plant sales manager for Chevrolet at Cincinnati, who will be a sales manager, and John S. Collins, formerly sales manager for Dodge Brothers at St. Louis, who also will be a sales manager.



## Miles and His Aides Plan for Next Shows

### Silver Jubilee Celebration to Be Feature of New York and Chicago Exhibitions

NEW YORK, July 14—In commemoration of the fact that the next national shows, the one in New York in January and the other in Chicago two weeks later, will be the twenty-fifth annual, it has been decided to duly honor the anniversary by terming them "silver jubilee" exhibitions.

This decision was reached last week, following a conference at the home of Samuel A. Miles at Christmas Cove, Me., presided over by the veteran show promoter, and attended by L. L. Fest, representing the Chicago show department; W. G. Sturm, representing the New York end of it, and Neal G. Adair, show manager of the Motor and Accessory Manufacturers Association.

It has not been definitely decided how the silver jubilee angle will be handled, but it is expected that the quarter-century celebration will figure prominently in the decorations.

Mr. Fest reported that the addition to the Chicago Coliseum is being pushed and that it will be ready in time. It will be known as the North Hall, giving a floor space 103 x 167, with a balcony for accessories. Exhibitors in the balcony will not be handicapped by vaulted ceilings as in the Coliseum proper, and it is expected that the new arrangements will add greatly to the convenience of the exhibitors.

The First Regiment Armory will be abandoned and the show itself confined to the three buildings—the North Hall, Coliseum and Coliseum Annex, thus housing the entire exhibition under what might be called one roof.

### Miller Recommends Use of Balloons on Trucks

AKRON, July 15—The Miller Rubber Co. in an official statement recommends balloon tires for buses and trucks of the smaller sizes, although it is pointed out that at present no balloon tire is designed for the heavier commercial vehicles.

This is the first announcement of any of the larger rubber companies here of their readiness to apply balloon tires on commercial vehicles since a similar announcement on the part of the Firestone Tire & Rubber Co. several months ago.

Manufacturers have been very reluctant to apply these new tires on commercial vehicles, and only very slowly are they proceeding in this direction. The balloon tire, it is admitted, remains in the experimental stage, and the experimenting is to be done on the passenger car and not on the commercial vehicle.

The Miller Rubber Co. statement says in part:

There is no reason why a bus or truck

should not be equipped with balloon tires, provided the recommended tire carrying capacity is not exceeded. In other words if a balloon tire of certain cross sectional diameter is rated by its manufacturer to carry a load of 1500 lb., it will carry that load just as satisfactorily on a commercial vehicle as it will on a passenger car. As a matter of fact, the commercial vehicle being for the most part slower moving than the passenger car, might be expected to receive even better service from balloon tires than the passenger car.

In many instances with these smaller vehicles balloon tires will prove unusually effective due to greater traction and greater protection of loads, essential in transportation of commodities.

### May Tax Collections Declined \$1,144,816

WASHINGTON, July 14 — A decrease of \$1,144,816 for May, 1924, as compared with May, 1923, in the collections of the manufacturers' excise tax on automobiles, motorcycles, accessories, etc., is reported in a supplementary statement of Internal Revenue collections for the month. The total collections for May just passed are given at \$15,653,622, as compared with \$16,798,438 for May, 1923.

The receipts from July 1, 1923, to May 31, 1924, show an increase of \$17,854,504. Total collections for this period ended May 31 last are \$146,069,580 as against \$128,215,076 for the earlier period.

Collections for passenger automobiles for hire during May last suffered a decrease of \$23,517 from May, 1923, the totals being \$66,013 to \$42,496 respectively.

Itemized collections for May last are as follows: Automobile trucks and wagons, \$1,098,427; other automobiles and motorcycles, \$11,539,012 and automobile accessories and parts, \$3,016,182.

### Receiver in Charge of Burdick Tire Plant

NOBLESVILLE, IND., July 14—Frank Lower has been appointed receiver for the Burdick Tire & Rubber Co. of this city. He has filed a \$25,000 bond and taken over active management of the plant. He was instructed by the court to continue the operations and to buy only such raw material as was necessary to keep the plant running.

The factory, which is said to have a capacity of 500 tires a day, has been on a 100-a-day schedule. The appointment of the receiver is understood to be the first step in a reorganization of the company.

### SPARK PLUG PLANT FOR MIAMI

MIAMI, FLA., July 14—Plans have been announced for the construction at Miami this summer of one of the largest spark plug factories in the South by the Airkool Spark Plug Co., recently organized at that city. A site for the proposed plant has already been secured, and construction work is to begin at an early date.

## Production Resumed in Akron Tire Plants

### After Shut Down by Several Plants, Output Is Running 70,000 Casings a Day

AKRON, OHIO, July 14—Production of automobile tires has been resumed on a normal basis following a week and 10 days' shutdown in the more important factories in the district.

Daily production is estimated at approximately 70,000 tires a day, although it is believed the 75,000 mark will be reached within the next two weeks.

Some of the companies were handicapped in getting back to full head production because many of the men who had been given vacations decided to remain at home and help on the farms after they were once out of the rubber city. As a result some of the larger companies are now hiring tire builders and finishers as rapidly as they can be obtained to bring up the production in these departments to balance with other parts of the factories.

Authorities estimate that through this shutdown of the larger Akron companies the completed inventory of tires in the hands of the dealers and the manufacturers has been brought below the 17,000,000 mark, as compared with the 19,000,000 tires it was estimated were in the country several months ago.

This figure is arrived at through the estimates that at least 500,000 tires would have been made in Akron during the period of the shutdown, and that at least 1,500,000 tires were sold through retail channels during the Fourth of July motoring season.

According to the best available information, production will not drop below the 70,000-tire-a-day mark this year. This is the low figure reached during the summer months of last year.

### English Dunlop Lists Semi-Balloon Types

LONDON, July 1—(by mail)—The Dunlop Co. announces that it will standardize a restricted range of semi-balloon tires for existing beaded-edge rims, of which the first size (31 x 4.4 in. to displace 30 x 3½ in. high-pressure) is now ready for the British market; other sizes are to be available in the near future.

In making this announcement Dunlop states that while recommending its wired-edge balloon tires on well-base rims, it recognizes that the full development of the low-pressure principle must of necessity be gradual, since the advantages will not be fully recognized until chassis manufacturers modify certain constructional features of their designs with a view to incorporating balloon tires as standard equipment. The semi-balloon is, therefore, to be available during the transitional stage.

## Z.R.-3, Now Building, Is Commercial Vessel

Details of Construction of New  
Airship Show How It Differs  
from Shenandoah

AKRON, OHIO, July 14—Details of construction of the Z.R.-3, the giant airship which is being built by Germany for the United States, which have been given out here by the Goodyear-Zeppelin Corp., show that, while in general appearance it is similar to the Shenandoah, yet in detail of equipment it is totally different. Where the latter is precisely what it was intended to be—a military flying laboratory—the Z.R.-3 is a commercial vessel, capable of transporting at least 20 passengers and a liberal quantity of cargo for distances as far as across the Atlantic or farther.

### Coming Across This Fall

The Z.R.-3 is being constructed at Friedrichshafen, Germany, being a "replacement" craft to which the United States Government is entitled as spoils of war in accordance with the Versailles Treaty. It is expected to be flown direct from Germany to this country this summer, or in the early fall, with a possibility of the flight terminating at Dayton during the Pulitzer meet. The distance to the eastern coast of the United States is about 4000 miles, but if storms compel a change of route, the ship may come via the Azores and either Bermuda or the Bahamas, a distance of probably 5200 miles.

As described by the Goodyear-Zeppelin Corp. the constructional features of the Z.R.-3 are as follows:

The Z.R.-3 has a length of 656 ft., diameter of 90.66 ft., and a height of 101.68 ft. It is designed to be inflated with hydrogen gas having a capacity of 2,472,000 cu. ft. The hull consists of the familiar structure comprising main ring members, intermediate rings and longitudinal girders. Metals used are duralumin, chiefly, with some steel. The main rings in general are 49.2 ft. apart. The keel or corridor is in the lower part of the hull. This corridor is situated partly inside, partly outside, the hull structure. It has the purpose of strengthening the hull, supporting the useful load, fuel and ballast, of distributing these weights, and of serving as a means of communication between the different parts of the ship.

The ship has five power cars, each of which is fitted with a 12-cylinder, 400 hp. specially designed Maybach motor, of 1500 r.p.m. No gearing is used between motor and propeller. Starting is accomplished by means of compressed air.

The fabric of the gas cells and the outer fabric of the hull are in general similar to that on the Shenandoah.

Underneath the bow of the ship the main car or cabin is situated close against the hull—in contrast with the power cars, which are some distance down, in order to permit the passage of air. This cabin consists of a smaller forward part forming the control car and a larger main part for passenger accommodations.

The passenger accommodations remind

## LIFT BAN, OWEN SAYS, ON FOREIGN STUDENTS

WASHINGTON, July 17—Percy Owen, director of the automotive division in the Department of Commerce, has enlisted in the fight to secure the admission into this country of students from foreign countries who desire to take courses at the Michigan State Automobile School of Detroit. Mr. Owen points out the presence of American-trained automobile men in foreign countries would greatly aid in stimulating the export trade of the United States in automobiles.

Immigration officials at present restrict the entrance of students in excess of quota to those desiring to matriculate at certain colleges and universities of high standing. The authorities of the automobile school, assisted by Representative Robert Clancy, are endeavoring to have this right extended to prospective students of the motor industry.

one of a cross between railway sleeping coach and steamer. The main room is subdivided into five separate compartments, each of which has two sofas oppositely arranged, as in a Pullman car. The sofas are 6½ ft. long, giving ample room for two people. Each double sofa, or berth section, accommodates four people. The backs comprise upper berths, the seats lower berths, and curtains give complete privacy at night. During the day tables can be put up between the sofas.

In this remarkable cabin are kitchens, pantries, storage rooms, and toilets and lavatories for men and women.

The total lift of the ship, weight of gas subtracted, is about 87,300 kilos, or 179,240 lb. Weight of the hull, with fins, rudders and elevators, inside arrangements, outer cover, gas cells, valves, rooms for useful load within corridor, rooms for control and passengers, is 28,200 kilos, or 62,170 lb. Weight of engines and fuel and fuel tanks, ballast tanks, special devices and instruments, electrical equipment and landing arrangement is 13,100 kilos or 28,880 lb.

### Speed at Least 76 m.p.h.

Under such conditions the useful load will be 40,000 kilos, 88,190 lb., guaranteed. Useful load in this case means all the lift after the dead weight of the ship has been deducted from the total lift. It comprises gasoline, oil, spare parts, crew, passengers and freight. The speed of the craft is to be not less than 76 m.p.h. with all motors running full, and a cruising speed with five motors of 68; with four motors, 63; and with three motors, 56 m.p.h. With the normal fuel supply of 21.2 decimal tons of gasoline and 2.4 tons of oil, the ship's radius of action will be as follows:

1. With five motors, full speed, 46 hours, 3500 miles.
2. With cruising speed, 78 hours, 5280 miles.

The influence of the wind's direction and strength also will have to be considered. But careful calculations show that the Z.R.-3 will be capable of cruising not only the ocean of atmosphere over the United States, but far out into either the Atlantic or Pacific Ocean as well.

## Snubber for Balloons Produced by Gabriel

New Type Eliminates Rolling or  
Galloping Action, Is Claim  
of Its Maker

DETROIT, July 16—The Gabriel Manufacturing Co., maker of Gabriel snubbers, has perfected a new type of snubber, designed to be used with cars equipped with balloon tires, which is now being placed on the market. The new snubber is declared to be in direct response to the demand by car and tire manufacturers and by the public for a definite and practical control of car springs where balloon or low pressure tires are used.

While similar in appearance to the standard Gabriel snubber, it is specially designed to meet the requirements with soft tires. These requirements, the company declares, are somewhat conflicting, in that there must be free action of the tires and springs to absorb shocks due to small bumps in the road, while at the same time the snubber must be more effective in checking rebound due to large bumps and excessive road irregularities.

Back of the development of the snubber is the certainty that the balloon tire is here permanently. The company view, as expressed by Claude H. Foster, president, is that balloon types are a pronounced advance over any previous tire development and are in response to a definite and long standing public demand for easier riding qualities.

It is claimed for the new snubber that it supplies the proportional control made necessary by the road action of balloon tires. Rolling or galloping action is eliminated, it is claimed. Exhaustive road tests have been made with numerous makes of tires and cars, supplementing laboratory tests, since the balloon tire was first introduced, and they have shown the new snubber to meet all conditions, says the company.

### BIG TRACTOR ENGINE ORDER

MILWAUKEE, July 14—The Wisconsin Motor Manufacturing Co. of Milwaukee, builder of truck, tractor and industrial engines, has completed negotiations with Ronaldson Bros. & Tippet, Pty. Ltd. of Ballarat, Australia, for the furnishing of a large quantity of 50 hp. four-cylinder gasoline engines for tractors. These tractors are to be assembled and used in Australia.

### LOWELL TURNS DOWN BUS LINE

LOWELL, July 14—The Lowell City Council has voted against the petition of the New England Bus Co. to run buses between Lowell and Lawrence. The petition of the Eastern Massachusetts Street Railway Co. for leave to run a bus line from Lowell to Boston was turned over to the city solicitor for an opinion.



## Motor Labor Surplus, Government Reports

### Unemployment Continues, Due to Reduction of Production by Automobile Industry

WASHINGTON, July 16—Unemployment continued in the principal automobile centers during June, due to the fact that some plants are operating only four days a week, while others are working at only 40 per cent capacity, it has been revealed here in the promulgation of the monthly digest of labor conditions issued by the United States employment service of the Department of Labor.

Without exception, reports from the automobile factory headquarters in Michigan, Ohio, Indiana and New York show surpluses of men with part-time schedules in effect. Throughout Michigan, the report sets forth, production in the automobile industry decreased, with the only requests for help coming from the building and farming industries.

Following are concise statements showing the condition of the automobile industry in the more important cities, which reflect an accurate picture of general conditions as they now exist:

#### MICHIGAN

**Detroit**—Industrial district: There is considerable unemployment with all automobile factories on part-time schedules.

**Flint**: A shortage of automobile workers exists in this city. The automotive plants are operating only four days a week at the present time.

**Lansing**: Due to a temporary lay off, vacation period, in automobile factories there is a large surplus of automobile workers at present and automobile plants and allied industries are working only on part-time schedules.

**Muskegon**: There is still a surplus of workers for automobile and automobile accessory plants and automobile plants and foundries are working part-time in some departments.

**Jackson**: A surplus of labor is reported, especially in the automobile industry.

**Traverse City**: Automobile plants are laying off men.

#### INDIANA

**Indiana**—General conditions: Forces in the automobile factories have been reduced.

**South Bend**: There is a surplus of labor here at the present time, due to some extent to a large automobile plant being partially closed down for a few weeks, affecting a considerable number of workers.

**Anderson**: A surplus of men is apparent in the steel and automobile industries.

**New Castle**: A surplus of labor is noticeable in the automobile industry.

#### NEW YORK

**Buffalo**—Industrial district: Some employment reductions are noticeable in the automobile plants.

**Rochester**: A labor surplus is evident in practically all lines with the exception of automobile accessory plants.

**Syracuse**: One automobile plant, employing 2000 workers, has closed down for a temporary period.

**Troy**: Automobile plants at Green Island continue dull.

**Elmira**: Some unemployment is noticeable here, particularly in the automobile and accessory plants.

#### WISCONSIN

**La Crosse**: Surplus of labor here owing to the closing of automobile gauge factories.

#### OHIO

**Cleveland**: The automobile industry and other plants are nearly all operating on part-time schedules.

**Cincinnati**: The automobile industry is operating about 40 per cent of capacity, affecting 800 workers.

**Toledo**: There is a large surplus here of workers in the automobile industry.

### Record Fuel Supply in Refineries June 1

WASHINGTON, July 16—The largest supply of gasoline yet recorded in the history of the country was on hand at refineries June 1, according to Bureau of Mines figures, which show total stocks amounting to 1,647,359,835 gallons.

The figures represent an increase of 39,573,431 gallons over the supplies on hand May 1, at which time a new high mark had been recorded. The daily increase in gasoline production in May, 1924, over the corresponding month in 1923 was 4,789,978 gallons, or 23.5 per cent. Compared with the output for April, 1924, there was a slight increase in the daily production, amounting to 8441 gallons.

Petroleum refineries in the United States established another new high record gasoline production mark in May when the total output of this commodity amounted to 780,194,019 gallons. This figure surpasses by more than 25,000,000 gallons the high record production mark made in April, which had in turn passed by 11,000,000 gallons the previous high record set in March.

Exports of gasoline in May amounted to 96,879,769 gallons, a decrease of 20,061,479 gallons. Imports showed a total of 14,265,697 gallons for May, an increase of 6,638,398 gallons.

#### ROAD MEN CALL MEETING

WASHINGTON, July 14—The American Association of State Highway Officials will hold its annual meeting in San Francisco Nov. 17-20. Among the major questions which will be taken up for consideration will be the Dowell bill, which failed in the last session of Congress, and which carried an appropriation of \$75,000,000 a year, for three years, for the national highway program, to be expended under the Federal State aid plan.

#### MAINE GETS GAS TAX

AUGUSTA, ME., July 14—Maine has gathered in \$68,000 as its gasoline tax during the month of June, and it expects to collect even larger sums in the next few months. The tax is working out satisfactorily. The cost of collection expected to be very large, has been really low, being not more than \$200.

## METAL MARKETS

While in the aggregate the volume of new business coming to steel producers still falls much short of what might be characterized as moderate mid-summer demand, the number of individual orders is decidedly on the increase. Many, if not most of these small orders bear indications that they are intended for automotive consumption and it is not at all improbable that there will soon be a repetition of automotive consumption leading the steel market out of its stupor and into a period of quickened activity.

Reports of "sheets losing more ground" are not borne out by the facts. In a market like the present one, competition for the lightest tonnages is keen, and very often an unsuccessful bidder wrongly concludes that because he lost an order, his competitor's price was lower. Policy frequently dictates as wide a distribution as possible of even small orders so as to have a number of mills to fall back upon when emergency accommodation of one kind or another is wanted. Certain it is that the 5.10 cents, Pittsburgh base, applies to the full-finished automobile sheet market generally. Rollers show little interest in the semi-finished steel market. It is supposed that a considerable carryover tonnage is responsible for this apathy. Moreover, sheet bar producers seem to adhere firmly to the \$40 quotation.

Strip steel makers have a large number of small-lot orders from automotive consumers, but the total tonnage involved in this business continues disappointing. Conditions among alloy steel specialists are much the same.

The frame of mind in which the industry finds itself is best illustrated by the comment that was heard on the last unfilled tonnage statement of the leading interest which showed that not in 13 years had there been so light a backlog of orders.

Not a few commentators rejoiced at the news on the ground that now the worst had come out, and that a turn for the better could not be far off.

**Pig Iron**.—The pig iron market is once more in the doldrums. Wall Street comment on the pig iron situation, to the effect that the recent decline in prices reflected "slowly falling costs" must be taken with a grain of salt and should not delude automotive melters into the belief that the days of pyrotechnics in the pig iron market are permanently over. The fact that some steel mills may be able to produce basic pig iron at as low as \$13 has no effect on the foundry and malleable market. Automotive foundries depend for their supply upon merchant furnaces. When there is an insistent and broad demand for pig iron the consumer always has and always will pay the full prices that result from keen competition among buyers.

**Aluminum**.—While offerings of resale metal in the Detroit and Cleveland markets are light, there is also an absence of demand. Importers firmly maintain the 27-cent for 98@99 per cent virgin ingots, and it is this circumstance that imparts strength to the resale market.

**Copper**.—Moderate improvement in foreign demand is not matched by domestic conditions. Consuming inquiry is still very light.

**Tin**.—Americans are still holding aloof from the London market which continues of a strictly speculative character.

**Lead**.—Higher prices in London attract Mexican metal, which, however, is not needed here. Storage battery makers are buying in a routine way.

# Calendar

## SHOWS

- Oct. 21-27—Transportation Show, Motor Truck Industries, Inc., American Exposition Palace, Chicago.
- Nov. 9-15—New York, Annual Automobile Salon, Commodore Hotel.
- Jan. 3-10—New York, National Automobile Show, under the auspices of the National Automobile Chamber of Commerce, Bronx Armory.
- Jan. 24-31—Chicago, National Automobile Show, under the auspices of the National Automobile Chamber of Commerce, Coliseum and First Regiment Armory.
- Jan. 25-31—Chicago, Annual Automobile Salon.

## FOREIGN SHOWS

- July 1-15—Dunkirk, France, Northern European Fair. Headquarters, No. 2 Rue Gaspard Malo, Dunkirk.
- Aug. 3-6—Dantzig, Second International Dantzig Fair, automobiles and allied equipment.

Aug. 23-Sept. 2—Bratislava, Slovakia, International Danube Fair.

Aug. 23-Sept. 6—Toronto, Ont., National Automobile Show in conjunction with the Canadian National Exhibition under the sanction of the Canadian Automotive Equipment Association and the Automotive Industries of Canada.

September—Vienna, Austria, Vienna International Fair.

Sept. 21-28—Prague, Czechoslovakia, Prague Autumn Fair.

Oct. 2-12—Paris, passenger cars, motor cycles, bicycles and accessories, Grand Palais.

Oct. 17-25—London, Annual Passenger Car Show, Olympia.

Oct. 22-31—Paris, motor trucks, stationary engines, garage tools and machine tools, Grand Palais.

Dec. 1-13—Montevideo, Uruguay—Second Annual Motor Show, under the auspices of the Centro Automovilista del Uruguay, held in

buildings of the Asociacion Rural del Uruguay.

## RACES

Aug. 3—Lyons, France, European Grand Prix.

Sept. 1—Altoona.

Sept. 1—Syracuse.

Sept. 7—Monza Track, near Milan, Italy, Italian Grand Prix.

Oct. 2-4—Dayton, Ohio, Fifth Airplane Race for the Pulitzer Trophy.

Oct. 4—Fresno.

Oct. 19—Manassas City.

Nov. 24—Los Angeles.

## CONVENTIONS

Sept. 8-11—White Sulphur Springs, W. Va., Annual Meeting of the Automotive Electric Association, Greenbrier Hotel.

Sept. 19-20—Niagara Falls, N. Y., National Battery Manufacturers Association.

Sept. 22-26—Boston, Sixth Convention and International Steel Exposition of the

American Society for Steel Treating.

Oct. 16-18—Briarcliff Manor, N. Y., Semi-Annual Meeting of the American Gear Manufacturers Association, Briarcliff Lodge.

Jan. 5—New York, Convention under the auspices of the National Automobile Dealers Association, Hotel Commodore.

Jan. 26-29—Chicago, Eighth Annual Convention of the National Automobile Dealers Association, Hotel LaSalle.

## S. A. E. MEETINGS

September—New York City, S. A. E. Automotive Transportation Meeting.

Oct. 21-24—S. A. E. Production Meeting, Detroit.

Nov. 18-19—Joint Service Meeting of the S. A. E. with the N. A. C. C. Cleveland.

Oct. 26—Aeronautical Meeting at Dayton at the time of the Pulitzer Races.

January—S. A. E. Annual Meeting, Detroit.

## Washington Analyses British Tax Removal

(Continued from page 176)

cars. Effective Aug. 1, cars from both countries will enter Britain free.

Consul Halstead informs that though the Canadian Government allows a drawback of 99 per cent on the duty paid on articles going into the manufacture of automobiles, it leaves a disadvantage of 1 per cent, and added to that are enough other expenses to put the Canadian automobile at a disadvantage of from 3 to 4 per cent as compared with the American product.

The dropping of the tariff barrier will improve the chances of other manufacturing countries, undoubtedly France and Italy, but fluctuating exchange in those countries acts as a very powerful deterrent in any expansion of their foreign markets.

Importers of American cars are optimistic and are expecting their business in Great Britain to increase anywhere from one-third to three-fourths when the duties are repealed. Nevertheless, it is believed certain that no sweeping cuts in prices can be made, since a portion of the duty saved will be used to equalize the close shaving of profits during the past, as well as to expand advertising and sales work on broader lines.

From a domestic standpoint, removal of the McKenna Duties will have a very pronounced effect upon the British motor car industry. It is generally thought that some scheme of organized action on the part of domestic manufacturers, cables Trade Commissioner Park, will shortly be inaugurated and that such advertising will take the form of "Buy British Cars and Be Satisfied." To counteract such propaganda, American importers are laying plans to advertise extensively and with concerted action on high quality and low prices of their products.

"All in all," concludes Commissioner Park, "it is the opinion among more conservative authorities that the adverse effects of removal of the McKenna Duties have been greatly exaggerated. Some of the smaller and weaker domestic companies may be forced out of business or into amalgamations with stronger concerns, but since it has long been argued that there are too many motor car manufacturers in Great Britain, this combination of interests may be found the one effective method of placing the industry on a firm foundation. The British market is a rising one and capable of much greater expansion. A large potential demand exists for cheaper cars, and the dropping of the tariff barrier will open up means of satisfying this demand and will doubtless have a beneficial effect upon motor transport as a whole."

## Starbuck Now Heads Affairs of Haynes Co.

KOKOMO, IND., July 14—Announcement is made by the board of directors of the Haynes Automobile Co. of the resignation of Hayden Eames as general manager and of S. E. Burke as general sales and advertising manager, and the assumption of active management by A. E. Starbuck, who has been treasurer, and by Raymond Ruddell, who has been a director. The two directors will be in active control of the situation from now on.

## CHARTER FOR WHEEL COMPANY

CINCINNATI, July 14—The American Flexible Wheel Co., which was organized by a number of Cincinnatians about a month ago, has been granted an Ohio charter. It was organized by Gerson J. Brown, Edgar S. Friedlander, Samuel S. Lord and others for the purpose of manufacturing a resilient automobile wheel. The company was incorporated with 2000 shares of no par value common stock.

## High Cotton Prices Will Help Business

ATLANTA, GA., July 15—Contrary to expectations, tractor and power farming equipment sales fell off to a considerable extent in May in the southeastern States, according to the monthly report of the Federal Reserve Bank of Atlanta. The reason, however, was principally due to the fact that farmers were too busy getting their crops planted to give much attention to any other matters, as in virtually all lines of southern crops there has been an increased acreage this year, cotton acreage increasing about 7 to 8 per cent over the entire belt in this section of the country.

As compared with May, 1923, total sales reported by the seven largest distributors of tractors and equipment in the Southeast showed a decline of nearly 20 per cent, while, compared with sales during April, the decline was slightly more than 33 per cent.

The buying power of farmers of the South, according to larger bankers of the district, has reached as high a point as it has attained in the past decade, due principally to high cotton prices prevailing, and tractor distributors express entire confidence in the future of the business in this district, for the most part expecting sales to increase steadily during the summer months.

Business the latter part of June picked up considerably and is expected to continue on this basis through July, according to estimates made.

## New Pierce Ready Aug. 1

BUFFALO, July 14—Formal announcement is made that the new moderately priced Pierce Arrow will make its public bow the first week in August, at which time full details as to price and mechanical features will be given out also.